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SIXTH ANNUAL PROCEEDINGS
OF THE
ASSOCIATION MILITARY SURGEONS
OF THE
UNITED STATES.

A SELECTION OF PRACTICAL PRESCRIPTIONS.

Muscular Soreness, Lagrippe Pains.
 R Antikamnia (Genuine).
 Quin. Sulph.....aa grs. xxx
 Pulv. Ipecac et Opii.....grs. x
 Mx. ft. Capsules No. x.
 Sig.—One every two or three hours.—Buffalo Med. Jour.

Trigeminal Neuralgia.

R Antikamnia (Genuine)...dr. ij
 Ext. Aconiti.....gr. ij
 Mx. ft. Caps. No. xvj.
 Sig.—One every two hours as advised.—Jour. of Ophthal.

Rheumatism. (Ac

R "Antikamnia Tablets".
 Sig.—One ever Alternated with R "Antikamnia Tablets".
 Sig.—One ever Hot Springs Med.

Painful Dysmenorr

R Antikamnia
 Brom. Potassi
 Elix. Simple:
 Mx. Sig.—T every hour in wa Journal.

In Painful Menstru

R Antikamnia
 Atropia Sulp
 Mx. Sig.—Give peating if nece Era.

Acute Articular Lagrippe.

R "Antikamnia Tablets".
 Sig.—One eve North Amer. Prac

Hysteria. (Alcoho

R Antikamnia (Brom. Sodii.
 Elix. Ammor
 Mx. Sig.—O three times a Prac.

Drunkard's Insomn

R Antikamnia
 Bromid. Pot
 Elixir Simplex ..q. s. oz. vj
 Mx. et Sig.—Teaspoonful as indicated. In water.—Practical Med.

Biliary and Nephritic Colic.

R "Antikamnia and Codeine Tablets".....No. xxiv
 Sig.—One every three or four hours.—Mass. Med. Jour.

Insomnia. (Hysterical.)

R Antikamnia and Codeine Tablets".....No. xxiv
 Sig.—One every two hours.
 P.S.—Crush tablets before administering.—N. Y. Med. Jour.

Pneumonia Aligned with Gripal Symptoms.

R "Antikamnia and Codeine Tablets".....No. xx
 Sig.—One every two to four hours.—L'Union Medicale.

Whooping Cough.

R Antikamnia (Genuine)...gr. xx
 Syr. Tolutan.....oz. j
 Aqua q. s.....ad oz. ij
 Mx. Sig.—One teaspoonful every two or three hours.—Med. Record.

Nervous Prostration. (Malarial.)

R "Antikamnia and Quinine Tablets".....No. xxiv
 Sig.—One, thrice daily.—Med. Herald.

Alcoholism. (Chronlc.)

R Antikamnia (Genuine)...dr. ij
 Tinct. Capsici.....oz. j
 Tinct. Nucis Vom.....aa dr. iv
 Elixir Simplexoz. ij
 Syr. Aurant. Cort. q. s. oz. vj
 Mx. et Sig.—Teaspoonful, in water, four times a day.—Med. World.

Uterine Contractions Leading to Abortion.

R "Antikamnia and Codeine Tablets".....No. xxiv
 Sig.—One as indicated.—Annals of Gynecol

Migraine, Headache, etc.

R Antikamnia (Genuine)...dr. j
 Potassi Bromdr. ij
 Sacch. Alb.dr. j
 Mx. ft. Cht. No. xii.
 Sig.—Take one every two hours.—Med. and Surg. Jour.

Night Sweats of Pulmonary Tuberculosis.

R Antikamnia (Genuine),
 Zinci Sulphaa gr. xxx
 Ext. Hyoscyamigr. x
 Ext. Nucis Vom..... gr. iiij
 Mx. ft. Caps. No. x.
 ke at bed-time.—Lancet

Especially with Rest-

imnia (Genuine) ..gr. vj
 Doveridr. j
 Digitalisgtt. iv
 every three to six hours, al Medical Times.

Abortion—Ovarian Neu-

minia Genuine...gr. vj
 xt. Viburnum Prun.dr. j
 ia Sulph.gr. i-j
 --Repeat in three or
 --Am. Gynacol. Jour.

sumatism and Neuralgia,
 minia (Genuine)
 mid. Salicyl.aa dr. j
 Cap. No. xx.
 ke four a day.—Leon-
 rated Med. Jour.

(From Mental Strain.)
 minia (Genuine),
 n. Brom.aa dr. ij
 Chart No. xx.
 e powder half an hour ring.—N. Y. Med. Jour.

uralgia, Rheumatism.
 minia (Genuine)...dr. j
 Quiniagr. xxiv
 Morphgr. j
 Chart No. x. As re-
 imes and Register.

æa when Menorrhagia
 minia (Genuine)...dr. ij
 Cht. No. xij.

Sig.—One every three hours.—Medical Mirror.

Gastric Catarrh of Drunkards.

R "Antikamnia and Quinine Tablets"No. 21
 Sig.—One every two or three hours.—Quarterly Jour. Inebriety.

Malarial Fever, Ague, etc.

R "Antikamnia and Quinine Tablets"No. xxiv
 Sig.—One every three hours as occasion requires.—Med. News.

Nervous Depression. (Alcoholic.)

R Antikamnia (Genuine),
 Tinct. Capsiciaa dr. ij
 Tinct. Cinchon. Comp. q.s.

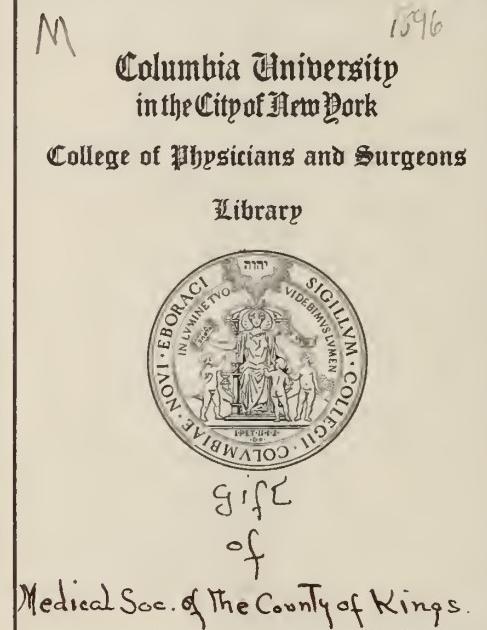
Mx. et Sig.—Teaspoonful three times daily.—Jour. Nervous Diseases.

Vomiting of Pregnancy.

R Antikamnia (Genuine)...dr. j
 Cocaine Mur.gr. j
 Mx. ft. Caps. No. x.
 Sig.—One capsule every three or four hours.—Amer. Gynacol. Jour.

Pains Preceding Labor,

R "Antikamnia and Codeine Tablets".....No. xv
 Sig.—One as directed.—Amer. Surg. and Gynacol.



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College of Physicians and Surgeons

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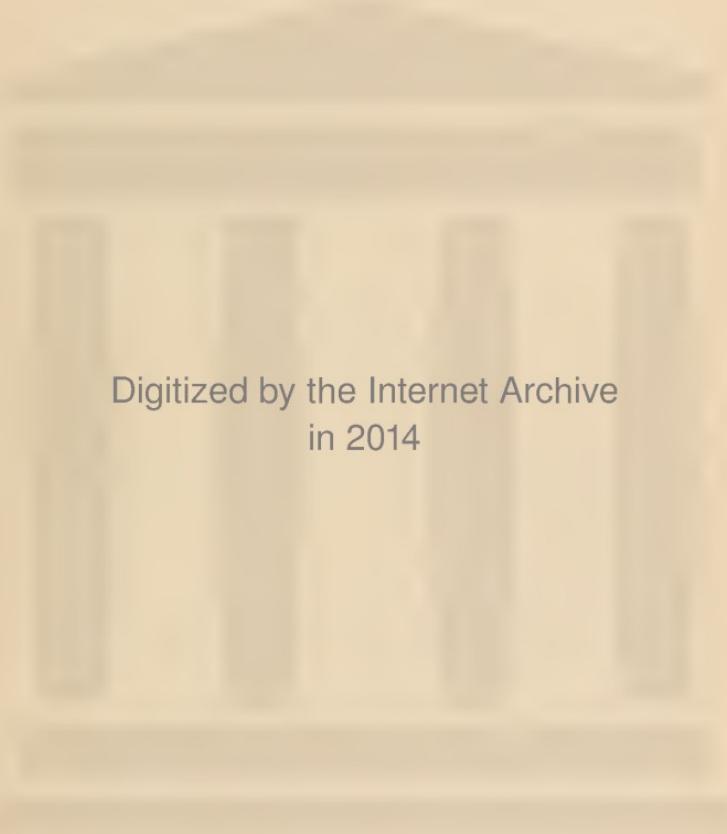


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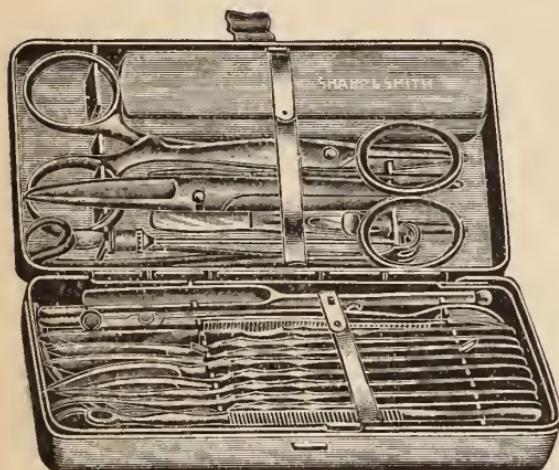
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PROCEEDINGS

OF THE

SIXTH ANNUAL MEETING

OF THE

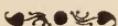
Association of Military Surgeons

OF THE

UNITED STATES.

HELD AT PHILADELPHIA, PA.

MAY 12, 13 AND 14, 1896.



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1896.



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OF THE
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The Seventh Annual Meeting of the Association will be held at Columbus, Ohio, May 25th, 26th and 27th, 1897.



Proceedings of the Sixth Annual Meeting
OF THE
Association of Military Surgeons
OF THE UNITED STATES,
HELD AT
PHILADELPHIA, PA., MAY 12th, 13th AND 14th, 1896.

FIRST SESSION—TUESDAY, MAY 12th, 10 A. M.
PROGRAMME.

Music by the First Regiment band. Prayer by Rev. H. A. Hoyt, Chaplain State Fencibles, N. G. P.

ADDRESSES OF WELCOME: State of Pennsylvania, by Hon. D. H. Hastings, Governor of the State of Pennsylvania.

MUSIC—

The National Guard of Pennsylvania, by Major General George R. Snowden.

MUSIC—

City of Philadelphia, by Hon. Chas. F. Warwick, Mayor of the City of Philadelphia.

MUSIC—

The Medical Department, N. G. P., by Brigadier General Thomas J. Stewart, Adjutant General State of Pennsylvania.

MUSIC—

The Medical Profession, by Dr. J. M. Da Costa.

MUSIC—

Remarks by the President of the Association, Col. Louis W. Read, Surgeon-General, N. G. P.

MUSIC—

OFFICIAL MINUTES OF THE PROCEEDINGS.

The opening meeting of the Sixth Annual Session of the Association of Military Surgeons of the United States was held in the Broad Street Theater, Philadelphia, Pa., Tuesday morning, May 12th, 1896.

After an overture had been played by the orchestra of the First Regiment, N. G. P., prayer was offered by Rev. H. A. F. Hoyt.

President Louis W. Read, Surgeon-General, N. G. P., then introduced Hon. D. H. Hastings, of Harrisburg, Governor of the State of Pennsylvania, who said:

MR. PRESIDENT, GENTLEMEN OF THE ASSOCIATION OF MILITARY SURGEONS, LADIES AND GENTLEMEN:

I am here as the Chief Executive of Pennsylvania to bid you welcome, to tell you that we are much complimented to have this Organization of the Regular Army and Navy and the National Guard of the several states of the Union meet here for the proper discharge of the duties that bring you together. You are as welcome in Pennsylvania as you are under your own roofs. I am sorry that there are not more of you.

It seems a little queer, a little odd, that this organization of Military Surgeons should meet in Philadelphia. Philadelphia is a Quaker City. We Quakers in Philadelphia do not believe in war —except when we are imposed upon. Here you are assembled in the city where long years before in the little State House on Chestnut street, a short distance below here, rang out the old, cracked Liberty Bell, and proclaimed to all the people of the world that a new Nation had been born. It was founded upon the Rock of Freedom. You are assembled in the city where a little American woman on Arch street, but a short distance from here, with her own hands framed a banner of silk of red and white and blue, that is now honored in every land and on every sea. You are assembled in a State that always responded to the call of patriotism before any other State in the Union, in all the great

emergencies that came upon her. I feel very proud to have the privilege of presenting that thought to you here this morning. Why, it was Pennsylvania that first heard the echoes from the shot that was fired on Fort Sumpter, and before these echoes had ceased upon the mountains of the Alleghenies there were five companies of 596 true souled men on their way to Washington, before any other military organization in all the country. They were the first to alight from the cars, the first to call on that man of blessed memory, the first to say to him: "We come from Pennsylvania, we are here to guard the Flag of Freedom and Liberty and to take our orders from you—Abraham Lincoln."

Of course, I do not know very much about the purposes and objects of your meeting, I know, of course, when people go to war they are liable to get hurt on their way to and fro, and while they are in camp that they are liable to get sick, and I *presume* that the Army and Navy Surgeons are necessary, I do not want to commit myself, I simply say I *presume* they are necessary. We never need them very much in Pennsylvania, all that we have needed during the past fourteen years is the President of your Organization, Col. Louis W. Read, Surgeon-General of the National Guard of Pennsylvania.

I do not know where you could find better soldiers than we have at the encampment of the National Guard of Pennsylvania. We never found it necessary to call in the State Board of Health to make our regulations for it, and to plan for it. We feel a little vain of our National Guard in Pennsylvania, and I presume that it is due more to our surgeons and assistant surgeons than any other Department that we have in the National Guard.

A good many thoughtful people in the country are wondering why so much money is being spent on the military, the army and navy of the Government. I am free to sustain that I do not think the U. S. Government is expending too much money on the regular army at the present time. I do not believe they have swelled the regular army or the navy to such undue proportions that it looks out of proportion to the balance of the country. The national guards, numbering 110,000 efficient men, all attest ably, by their education, their development, the great interest taken in them by the public and the confidence that is so freely

given to them and the expressions of good will and of support, it is not necessary to have a much larger standing army than we have at the present time.

We have more than 8,500 men in our National Guard organizations scattered all over the Commonwealth. If Major General Snowden, who is sitting on this stage, should issue orders to have the Guard assemble in Pittsburg, on the banks of Lake Erie or Philadelphia, 8,500 men would respond within twenty-four hours of the time they had received that order.

We must not forget the fact that it is entirely voluntary on their part; the rank and the file all come from the voluntary efforts of the good citizens of Pennsylvania, and the rank and the file of our N. G. P. is composed of the very best people we have within the limits of our Commonwealth. Our State contributes in support of her National Guard a larger sum of money than any other State in all the United States, excepting New York State. We now raise and appropriate over \$300,000 to support our troops, and I am satisfied that if judgment should dictate that the National Guard organization needed twice that amount, the patriotic people of this Commonwealth would come speedily, loyally to their support. With this condition of affairs in Pennsylvania and with these different department organizations such as your Medical Organization meeting in Philadelphia to-day, and the other organizations that are relative to the general purpose, I can see in the future that the United States of America will truly have one of the most efficient military organizations to be found in any nation in the world. I hope the time will never come when you will be called upon to perform these duties in which you are being educated. I hope the time will never come when we shall be compelled to go to war. The best way to prevent war is to be ready for war. The best way to prevent the strikes and social disturbances in the Commonwealth of Pennsylvania is to be ready to quell them upon a moment's notice. The best way to preserve life and property within our Commonwealth is this. We do not know how soon the time will come when we shall be called upon to go to war, and I want to say to those present that if the Spanish Government shall permit those American citizens who were sentenced to be executed, to be killed without due pro-

cess of law, they being innocent, I for one, as an American citizen, and I hope every able-bodied American in the land, in the protection of our flag, will arise in might to avenge the murder of these American citizens.

Now, my part is done and done the best I can do. I cannot say more than I have in welcome; perhaps General Snowden can, perhaps Mayor Warwick can, and I will give them a chance.

Major-General Snowden succeeded Governor Hastings, with the subject, The National Guard of Pennsylvania. He said :

"Our experiences with the surgeons have been most pleasant. One in particular I remember who I always regretted had bound himself to the medical profession, for if he hadn't been such a fine surgeon he would have made a magnificent commanding officer. Many of them, in addition to ranking high in their professions, have distinguished themselves in arms." He then cited a number of instances that had come within his personal knowledge. In concluding, he offered words most commendatory of the National Guard, and the hope that at all times the two branches of the service, the medical and the non-medical, should retain the same pleasant relations.

Mayor Warwick gave a most cordial welcome to Philadelphia, and said:

MR. CHAIRMAN, LADIES AND GENTLEMEN:

I am sorry to say that I have an engagement at my office at 11 o'clock, and as this session has started so promptly this morning, 11 o'clock is almost here, and I should be there.

My single duty is to extend to you a welcome, and I promise you that Old Sol and I will make it the warmest that you have ever had in this city of ours. The Governor in his remarks invited you to come to Harrisburg, and expressed his sorrow that you had not done so on this occasion. I with a number of gentlemen on this stage congratulate you on not having gone there, if you had gone you would have been sorry. I advise you in the

future, so far as our City and her reputation is concerned, always to hold your Conventions here. This is the best place that I know of. We have good theatres, we have everything here that will make your days and nights especially happy, particularly the nights.

I am glad, however, to welcome you all. I will not encroach upon your time or trespass upon your patience. If I were to do so you might have a case of prostration, and I do not want you to try your skill upon me.

I do extend to you, gentlemen, Army Surgeons, I do extend the warmest welcome possible and desire that your stay here may be a pleasant one, that the papers may be instructive and educational, that are read before you as a body, and that you may in every possible way advance the cause of your science, and at the same time by your presence add to our revenues and reputations —is the wish of the gentleman who has the honor to welcome you and to preside over this city at this time.

Brigadier General Thomas J. Stewart followed with these words:

LADIES AND GENTLEMEN AND MEMBERS OF THE ASSOCIATION OF
MILITARY SURGEONS:

It might appear to many of you that I was to talk on the subject of the science of medicine. That would wind up about as rapidly as the music a while ago. Some of my friends said: "I never knew you knew enough about medicine to deliver an address on it." I said I never knew that myself. I understand my duties here are to represent the medical staff, the Medical Department of Pennsylvania. The Governor has welcomed you on behalf of the State; the Major General has welcomed you on behalf of the National Guard of Pennsylvania, his Honor, the Mayor, on the part of the City of Philadelphia.

I might have entered into a discussion on medicine, and told the story of the ancient temple in which serpents were kept and how, when a pestilence came along, the people would flock to the temple for aid, and how the serpents were a source of profit to the priests. I realize that snakes are adjuncts to the profession

even in these days. I remember having heard of a gentleman coming into a prohibition town, and this will show that snakes are associated with the medical profession to-day. He landed there with a strong desire for something to soothe his nerves. He consulted one of the residents as to where he could find refreshments. "You know this is a prohibition town," was the reply, "you will have to go to the apothecary." He went to the apothecary and made known his need. "You will have to have a prescription," was the reply. "But I do not know where to get a prescription. I don't know any one here. Do give me a drink." "I can't sell without a prescription." "I am in horrible shape, how can I get a drink?" "We can't sell it without a prescription, unless for snake-bite." "Where is the snake?" Then he gave him the address of the snake, and the thirsty man departed. Presently he returned exclaiming: "I hunted up the snake to get bit, and the confounded reptile is engaged for six months, do give me a drink."

But I realize that there are others to follow me, who will speak to you on subjects more interesting than anything I can say; but on behalf of the officers of the National Guard of Pennsylvania, I want to extend to the visitors here to-day a most cordial welcome. I want to assure you of the great joy, pride and honor we feel, especially the National Guard, that you have selected in our honored Surgeon General Col. Louis W. Read, your President. He has held the position of Surgeon General for twenty-two years, filled it ably and filled it well, a man whom we appreciate, a man whom we are glad to honor, a man with a magnificent record. I extend to you a cordial welcome on behalf of the Surgeon General of the Division, who never sleeps and never wearies. I extend it on behalf of the Third Brigade, on behalf of the entire Medical Department of the National Guard of Pennsylvania. I trust that our meeting may be distinguished with pleasantness, happiness and wisdom, and that it may be beneficial, and that no man who has a room such as 33, or 101, or 202, that looks the same coming either way, may depart with regret. I extend on behalf of the National Guard of Pennsylvania a warm welcome.

Dr. J. M. DaCosta, President of the College of Physicians of Philadelphia, said:

SURGEONS: On behalf of the Medical Profession I bid you welcome to Philadelphia, I bid you welcome to its institutions of learning, to its rich collections, to its workshops alive with fruitful activity, to its great libraries. I bid you welcome to our homes. I extend to you a brother's welcome to our hearts.

Medical men have been always regarded as indispensable to the proper charge of armies. Esculapius himself served as an army surgeon, and his two sons, the Greek poet tells us, took care of the wounded before Troy. Greatly has the military surgeon ever been esteemed. Paré was handed down by one king of France to another as a precious legacy. The order directing him to the siege of Metz, said: "I send you my beloved Paré, equal to a reinforcement." Larrey, picked up wounded on the field of Waterloo, was at once released, and Napoleon's words in regard to him will pass on through centuries, "To the most virtuous man I have known."

Washington refers in his will to Craig as "My compatriot in arms, my old and intimate friend."

How greatly the duties of the medical officers are changing. At one time, indeed, until recent years, he was much more occupied with disease than with wounds. The army of Henry V. was, before the battle of Agincourt, reduced by illness from fifty-nine thousand to ten thousand. Frederick the Great, in the history of his own campaign, says that a single epidemic of fever cost him as many lives as seven battles. The havoc by illness in the Walcheren campaign is well known in history. In the Crimean war, the French lost by disease seventy thousand three hundred and seventy-five (70,375), as against killed by wounds twenty thousand two hundred and forty (20,240); the Russians by disease, six hundred thousand (600,000), killed by wounds, thirty thousand (30,000); in our own war about one hundred and four thousands (104,000) fell in battle or died of wounds and injuries; over one hundred and eighty-six thousand (186,000) perished by disease, and twenty-four thousand one hundred and eighty-four (24,184) from unknown causes; with a total result of

three hundred and four thousand three hundred and sixty-nine. I take the figures as made up in the Surgeon General's office; they, too, show the vastly more destructive effect of disease than of bullet and of sword. The first time in modern warfare in which the proportion was changed, and it was largely due to advancing knowledge in hygiene, and to rigid enforcement of its rules, was in the Franco-Prussian War. In 1870, out of a total of 40,382, 12,180 were lost by disease and 28,202 by wounds. And so it is likely to be in future campaigns. It is the military surgeon and not the military physician who will be most at work, provided, however, the lessons of sanitary experience are heeded, and the Commanding General understands that by taking and by acting on enlightened medical advice, he can save corps of his army enough to prevent defeat, or to turn indecisive engagements into brilliant victory.

And it is a blessing that all the workers of the world are coming to the aid of the medical officer; that you can draw freely on the professional stores being accumulated by science. For every laboratory experiment, for every thoughtful research into the laws of health, there may be not one, but hundreds of lives to show. If smokeless powder and Maxim guns and small calibre repeating rifles and coated bullets and long range fire will add greatly to the destruction on the battle field, off the battle field the enforced results of science will lessen immensely the loss of life that inevitably happened in former wars. You thus must still be, as in the past, medical as well as surgical officers; then the highest duties of your profession are reached.

There is one aspect in which the change in modern warfare will be injurious to the army surgeon. He will be exposed to greater risks in consequence of the new arms. The risks will always be great. During our Civil War 336 of the Regular and Voluntary Medical Staff, Assistant Surgeon General Alden, U. S. A., has informed me, were killed in battle or died of wounds or accidents or disease; at Gettysburg alone thirteen medical officers were wounded, a proof of their heroism and devotion. These losses were, however, greatly exceeded in the recent conflict between China and Japan in consequence of the long range weapon used by the Japanese. The casualties in the medical corps were

enormous. The French Military Attaché reports that four per cent. of the total number killed and wounded among the Chinese were doctors. I presume it is meant among officers, for if the proportion was applied to all grades, it would, indeed, bespeak frightful carnage.

But no matter what the risk, there will never be any deterioration of spirit, any sign of unwillingness to encounter it. A very recent instance from the Chitral campaign shows this and tells the same old story. Here is the record. During a sortie, the Captain commanding is badly wounded, a mile and a half from the fort, and surrounded by the enemy. Surg. Capt. Whitchurch proceeds to his rescue. But, under the heavy fire, his little party keeps constantly diminishing in numbers. He places the wounded captain on his back, every now and then letting him down to head the men in a charge to drive off the assailants. So, step by step, fighting, yet carrying his comrade, he finally reaches the fort, and then, wounded as he is himself, his first action is to dress the wounds of his comrades. Was ever a Victoria Cross better bestowed than the one on him? Yet this is only one more illustration of the gallantry, the sense of duty so common among military surgeons. We have long looked upon them, and every day proves how truly, as uniting two professions, as possessing the courage and sense of honor of the soldier, with the exalted devotion to duty and the high traditions of a doctor.

But I must not be tempted into saying more. Even the warmest welcome can be too long drawn out. May your visit here prove all that is anticipated, and may you feel the true fellowship that greets you, and that draws us towards you.

President Read then called Vice-President Albert L. Gihon, U. S. N., to the chair, and read his presidential address:

ADDRESS OF PRESIDENT READ.

GENTLEMEN:

To me this is a new departure, that of presiding over a symposium or the deliberations of so many distinguished men. Al-

though fully appreciating the great honor, I enter upon this duty with diffidence and distrust; but with an intuitive feeling of confidence that you will be lenient and overlook my shortcomings, I accept the responsibility.

Permit me to echo the expressions of cordial welcome accorded you by the gentlemen who have preceded me, and hope that when your duties here have ceased and you have taken your departure, that you will have indelibly impressed upon you many of the characteristics of Philadelphia and Philadelphians; some of which are charity, generosity, hospitality and a pronounced regard and admiration for cultured and scientific men.

I take much pleasure in expressing the feeling of enviable pride that is engendered from the consciousness that there are in the membership of this association gentlemen who are the peers of the most eminent members of the profession abroad and at home.

This, our Sixth Annual Meeting, has a most auspicious opening. The assembling of so many men, not only of national but international reputation, with a common incentive, representing nearly every State of the Union, the representative medical officers of the Army and Navy of the United States, has a significance that portends great possibilities and indicates that this association is to be the great or potential factor in disseminating and elucidating all that is new or recently discovered in general medicine, and also all that appertains to the advancement of the science of military surgery.

It was the extensive and ever extending field in the domain of medicine, and the intricate and complex problems that were continually pressing for solution in conjunction with the individual responsibility of applying the resources at command to the direct treatment of disease, that years ago disposed members of the profession to seek each other's counsel and form groups or clubs for the comparison of views and mutual improvement. The great advantages accruing from these comminglings prompted more extended social gatherings, until at the present time a large portion of the more progressive members in every civilized country are participating in local, municipal, national and international medical organizations. In the more frequent and familiar comparison of views and cases on all professional subjects in the local so-

cieties, closer habits of observation and a wider range of thought are induced, and bigotry and narrow prejudices give place to generous rivalry and personal friendships. In the larger gatherings, the formal preparation of papers and reports impels their authors to a wider range of study and greater mental discipline; while the collision with other minds in discussion develops all the aspects of the subject, and enlarges the scope of mental vision by starting new trains of thought and begetting a broader and stronger mental grasp, with purer and nobler aims in life.

There has been no influence in society during the present century that has done so much to develop and diffuse medical knowledge, to stimulate its practical application in hygiene and sanitation for the prevention of disease, and its clinical and thereapeutic resources for the alleviation of suffering, as has been accomplished by the combined or aggregate medical society organizations of the world. Yet their capacity for conferring still greater benefits under proper management will become more manifest in the near future.

This is pre-eminently the age of mental activity and progress in exact and scientific knowledge. The surgical profession was never so active as now, never so prolific in great and beneficent results, never so successful in venturesome exploits.

Masterly intellects on both sides of the Atlantic are leading in this great work, and broadening and strengthening the scientific foundations of our profession. Under this inspiration the whole field of surgery is undergoing thorough and complete revision. Surgical pathology was never more zealously or successfully cultivated.

Therapeutic surgery is making rapid advances, and rendering more sure the work of the knife. Operative surgery is adding one brilliant success to another, and commands the admiration of the world to a degree never before attained. In whatever direction the surgeon may look the prospect is gratifying, and he is animated to strive for still greater achievements. From this elevated standpoint we have come to measure the extent of the progress made. In no department of modern surgery have more marked and brilliant results been attained than in that pertaining to the abdominal cavity. It has been but a comparatively short

time since the abdominal cavity was to the surgeon a *terra incognita*—a forbidden field which the knife and ligature dared not enter. Even when a wound invaded this region it was sacred from the surgeon's interference, and it was the teaching to close it hermetically and trust to nature for the consequences. In such a presence the hand of the surgeon was paralyzed, its skill was as naught, and the surgeon turned his face in despair, as in all the resources of his art no remedy was to be found.

At last in the backwoods of Kentucky the genius of Ephraim McDowell flashed upon the darkness that had so long environed this subject. Almost contemporaneously in the far-off hills of Scotland a provincial practitioner named Bell bore alone a torch in the unexplored region of abdominal pathology, and first pointed the pathway which even he had not the nerve to tread. A spark from that torch dropped upon the fervid soul of McDowell, who had the courage and skill to utilize and develop it, and from the successful results following his masterly efforts the privilege was accorded him of constituting himself the apostle of a new era in the domain of surgery.

McDowell's first subject may justly rank among the world's sublimest heroines. A courageous woman, whose heart and brain were equal to the task of encountering a risk before unmatched in the annals of woman's faith and endurance, she mounted with a willing martyr's tread the operating table of the intrepid surgeon, and became the instrumentality of redemption from untold agony of her suffering sisters. Neither the pen of history nor the lyre of song has ever told a nobler story than of this true-hearted matron. And the records of surgical science embalm no triumph of its art greater than McDowell's.

He performed thirteen laparotomies with phenomenal success, and it would appear from this favorable showing that abdominal surgery should have taken firm hold on the profession and led to important results long ere it did. But for many years after McDowell's death it shared the fate of many important scientific discoveries, and remained in a state of abeyance or desuetude.

The great merit of its successful revival is unquestionably due to the late John L. Atlee, of this City. The precedent of McDowell probably had little, if any, influence on these pioneer

surgeons, who by long continued and persistent labor, bearing the brunt of professional opposition and obloquy, demonstrated the value of the operation of ovariotomy.

Dr. Washington L. Atlee, in an address several years ago, said: "During the probationary stage of ovariotomy I have been under the ban of the profession, and had to suffer from unjust obloquy. I was denounced by the general profession, in the medical societies, in all the medical colleges. I was misrepresented before the medical public, and was pointed at as a dangerous man, even as a murderer. The opposition went so far that a celebrated professor, a popular teacher and captivating writer, in his published lectures, invoked the law to arrest me in the performance of this operation." To-day no portion of the abdominal cavity is prohibited territory.

The advance in operative abdominal surgery has had such a wide range of application that under its spirit and success surgeons have been emboldened with the support of antiseptic measures to venture into other regions, until recently regarded as beyond the pale of legitimate interference. The brain, one of the most intricate and delicate structures, both anatomically and physiologically, has become one of the most fertile and promising fields for operative effort. Brain surgery is claiming a very large attention, and a degree of progress on safe and conservative lines is being attained which in the near future will add crowns of triumph to our profession.

ROENTGEN'S DISCOVERY.

No discovery of recent years has aroused such universal interest in the scientific world as that made by Professor Roentgen, of Wurtzburg, demonstrating the possibility of producing invisible rays capable of vibrating through substances hitherto regarded as impenetrable.

In an address delivered one year ago by Dr. Arthur W. Goodspeed, Professor of Physics in the University of Pennsylvania, on the subject of radiant matter, he said impressively to his class: "Gentlemen, we have reached the end of our knowledge. Science can tell us nothing more. We stand at the verge of the unknown." To-day the boundary has been pushed back one step

farther, by the discovery of the Roentgen ray. The experiments are so simple, and so easily comprehensible, and the result so novel, startling and pregnant with possibilities, that the interest of the world has been aroused at once as by no other scientific achievement for a quarter of a century. No discovery in this age of discoveries has, or promises to have, greater effect on the popular mind, upon future development of research and upon applied science in giving to medicine and the arts simple and certain processes of investigation.

To Faraday is due the first suggestion. In 1816 he wrote: "If we conceive a change as far beyond vaporization as that is above fluidity, and then take into account also the proportionally increased extent of alteration of properties as the rarefaction rises from solid to liquid and from liquid to gas, we shall, perhaps, if we can form any conception at all, not fall far short of radiant matter." Radiant matter was then the first bold conception.

William Crookes, a young man in London, inspired by this suggestion, devoted himself to creating a vacuum, such that the atmospheric pressure would be reduced to one twenty-millionth. In this state the molecules have the ability of traversing the tube, when repelled by the electric current, leaving the tube dark, but inflaming the glass opposite the cathode to brilliant phosphorescence. In 1879, Crookes, with almost prophetic foresight, wrote these memorable words: "We have seen that in some of its properties radiant matter is as material as this table, whilst in other properties it almost assumes the character of radiant energy. We have actually touched the border land when matter and force seem to merge into one another, the shadowy realm between the known and the unknown. I venture to think that the greatest scientific problems of the future will find their solution in this borderland, or even beyond. Here, it seems to me, lie ultimate realities, subtle, far-reaching, wonderful."

The late Heinrich Hertz carried his experiments a step farther. Then Philippe Lenard demonstrated characteristic peculiarities of the cathodic rays.

It was reserved for William Roentgen to show that another and different kind of "rays," which were not the cathodic rays of Crookes, Hertz and Lenard, were produced at the cathode of a

larger vacuum tube. This was not an accidental discovery, but the result of careful deductions.

The physical properties of the newly discovered rays are that they develop no heat, are invisible, and incapable of reflection or of being refracted by glass lenses or passing through water, and are not affected in any way by the presence of a magnetic fluid.

Recent as this discovery has been, its applications have been many and valuable, although the whole subject is in an embryotic state.

In the year 1890, Mr. Jennings, of Philadelphia, had associated himself with Dr. Goodspeed in experiments on spark photography. One evening, the 22d of February, 1890, at the close of work, with the table still littered by plate-holders and apparatus, Dr. Goodspeed brought out the Crookes tubes for Mr. Jennings' amusement. Next day that gentleman wrote that he had had a curious failure among his plates—a negative spotted by two disks, but since no one could explain the phenomenon, comparatively uninteresting as it was, the plate was thrown aside and forgotten. Six years later, after the discovery of the Roentgen rays, it was recalled to mind and recovered. A duplicate was prepared under exactly the same circumstances. It was in a lecture on the evening of University Day that Dr. Goodspeed told the story, and concluded thus: "We can claim no merit for the discovery—for no discovery was made. All we ask is that you remember, gentlemen, that six years ago, day for day, the first picture in the world by cathodic ray was taken in the Physical Laboratory of the University of Pennsylvania."

Such is the story of the development of a process entirely simple and of such sequence as to be almost obvious. Yet if its very simplicity had not concealed it the story would have been cut short years ago, and America instead of Germany would have held the palm. A case in the Philadelphia Hospital under the charge of Professor J. William White, of ununited fracture of the forearm, has been radiographed within the past few days by Dr. Goodspeed, and the illustration shows very distinctly the fractured bones, the wires holding them in apposition and the twists of the wires.

A recess was taken at noon and the Association assembled on

the sidewalk opposite the Hotel Walton to witness the raising of a flag upon the tower of the hotel, which had been made by the Committee of Arrangements and presented to the Association as its distinctive flag.

SECOND SESSION—TUESDAY, MAY 12th, 3 P. M.

Vice-President Gihon called the Association to order at 3 P.M., in the Hotel Walton.

The Secretary, Lieutenant Colonel Chancellor Mo. N. G., having been detained by a personal bereavement, the Editor, Major P. F. Harvey, U. S. A., acted as Secretary pro tem, by appointment of the Executive Committee.

There being no reports of Committees ready for presentation, the reading of papers was commenced.

The following papers on the programme for the afternoon in the absence of their authors were read by title, to wit:

"The Emergency Ration."—Captain C. E. Woodruff, Assistant Surgeon, U. S. A.

"Experiments with Emergency Rations."—Captain L. A. La-Garde, Assistant Surgeon, U. S. A.

"Tetanus Resulting from Powder Burns."—Captain L. A. La-Garde, Assistant Surgeon, U. S. A.

"The Effects of Cannon Firing and Explosion on the Ear."—Dr. Samuel Sexton, New York City.

Col. C. H. Alden, Assistant Surgeon-General, U. S. A., then read a paper, entitled "Instruction of the Hospital Corps, U. S. Army."

Vice-President Gihon then called upon Major D. A. Kuyk, of the First Regiment of the Virginia National Guard, to read a paper he had prepared on "The Hospital Corps."

Vice-President Gihon suggested that it would be best to have all the papers bearing on this topic read, and embrace them in one discussion. In accordance with this proposition he called upon Captain J. J. Erwin, Assistant Surgeon, O. N. G., for his paper on "The Annual Encampment and What it Teaches the Surgeon of the National Guard."

Vice-President Gihon called upon President Louis W. Read to open the discussion, which he did as follows:

MR. CHAIRMAN, GENTLEMEN OF THE ASSOCIATION:

As President of the Military Surgeons and Surgeon-General of Pennsylvania, Col. Alden's paper has impressed upon me a feeling of humiliation, mortification and annoyance. I have always congratulated myself that we had the best hospital corps in the United States. I have had the experience of two wars and should know something about it. I gave a great deal of attention to formulating an order that conformed as closely as possible to the regulations of the United States Army. Twice during my administration, I have had the Assistant Surgeon General, and Honorary President of this Association, Col. Greenleaf as a guest first, and then as a detailed officer. I knew him very intimately and very pleasantly, and I asked him to come with me to one of our encampments, and he was so pleased and gratified with the working of our hospital corps that he passed a most beautiful and delightful eulogium upon it. He said to me: "Read, I can make no official report as a guest, but you have me detailed next year, will you, please?" and I said, "Nothing will give me greater pleasure, Greenleaf." And the next year he was so detailed, and passed upon us splendid words of praise. I congratulated myself that I thought we were close up to the Army. A few weeks ago I received a letter from Col. Alden asking me to report the condition and working of the hospital corps of the State of Pennsylvania. As my executive position gave me the opportunity to do it, I selected Major Egle, the Senior Brigade Surgeon of the National Guard of Pennsylvania, and asked him as a personal favor that he would write to Col. Alden giving him all the information he required, and be very careful to give him all the detail, as I felt we had a most creditable corps. That seems not to have been done. I asked Major Edward Martin, Regimental Surgeon of the Third Regiment, First Brigade, N. G. P., to write out an account of the methods employed in the hospital corps under his charge. Major Martin has direct supervision of the corps, and I consider it one of the very best Regimental corps in the National Guard of Pennsylvania, that is, I consider the hospital corps of the Third Regiment one of the very best. Dr. Alden seems to have heard from neither of these gentlemen. I would have taken occasion to have written them up myself, had I not supposed this

matter had been attended to, and I feel greatly annoyed, mortified and humiliated that Dr. Alden did not have this information.

Major Egle, on the request of President Read, to describe the working of the Hospital Corps in Pennsylvania, said:

It affords me very great pleasure to say something of the drill of the hospital corps of the State of Pennsylvania. Unfortunately, I am not a public speaker and I know that Major Weaver is able to give in detail the facts in regard to the hospital drill, etc., of the hospital corps of Pennsylvania. I therefore call upon Major Weaver, of the First Brigade of the N. G. of Pennsylvania.

Major Weaver stated that there is no better man to explain the subject under discussion than Major Egle. What we don't know on this subject he does.

I presume Major Egle did not make out the report referred to because Col. Alden was supposed to know everything about the subject, and Major Egle thought it was not necessary for him to send the information. I am very sure he was fully capable of doing it. The Hospital Corps of the N. G. P. is a well organized body of men. Each Regiment has its corps of four men, and every detached organization has also a corps of two or four under the direct control of the Regimental surgeons, and as to the amount of drill, this is largely left to the convenience of the Regimental surgeon. I am very sure that so far as I have been honored by being appointed Brigade Surgeon, it has been my desire that the Hospital Corps of the Brigade should be a very efficient service. I proposed that they should have at least a monthly drill. I proposed that we visit them, and see the result of the corps drill at the end of a fixed period. At the end of a year I proposed we should have a competitive trial, and give a medal or in some other way recognize the degree of efficiency they had reached. We must understand that in a corps like the N. G. P. we are differently situated than the regular Army. Our surgeons are exceedingly busy men, most of them active practitioners living in the country; those in the city are engaged in practice and hospital work and they do not feel that they can give the time that is required for the proper drill of the Hospital Corps. Our men, too, are busy and cannot give much time, and it seems almost impossible to get the men together for purposes

of drill. These are a few of the difficulties we have to contend with.

Still the Corps is drilled during the winter season, and a short time before the men go into camp they are given special instruction, so when we arrive at camp we find they are quite competent to perform their duties. We make it a point during our Annual Encampment to have the corps drill. Finally all come together with an exhibition drill, and we have the Governor of the State, Commandants and all others interested, and we go through all the drill from beginning to end.

There is another point. The attention given to the Hospital Corps by the authorities has not been as great as it should be. It has not been possible to get as much recognition, nor to give the men the stimulus they need for the proper performance of their duty. There are a great many difficulties surrounding the Hospital Corps of the country regiments. I feel sure we should do better if our Hospital Corps were separate organizations, as in Massachusetts, located in some separate place, and when we go into our annual encampments have so many men detailed for each Regiment, and let them be placed under the command of an officer who shall be responsible for these drills. As it is now in the Pennsylvania National Guard the Colonel gives us in these regiments men that are not very much use, men that are of not too keen intelligence. We labor under difficulties, we do not get the men who have the greatest aptitude for learning, and we meet with difficulties that you do not have in the regular Army, and these difficulties are hard to overcome. Notwithstanding all this I do not think we have reason to be ashamed of our Hospital Corps. I feel sorry for Dr. Read's mortification, but I am sure he has no reason to think that we are not progressive in the matter of hospital drill. The officers of the regular army have inspected our drill and they have expressed themselves very well pleased, and wondered at the degree of efficiency to which these men have attained. I hope that the Medical Department will be more thoroughly recognized, and that the place of the hospital corps in the annual encampment will be recognized, and the drill of the hospital corps regarded as of as much importance as the Brigade drill. When this is done we will be able to make

a showing at our annual encampment at which the Surgeon-General need not be ashamed, and of which any other man might be proud.

President Read said:

I am not ashamed of the Hospital Corps of Pennsylvania, but it was Col. Alden's reference to it which mortified me.

Comimodore Gihon then called upon Lieut. Col. E. L. B. Godfrey, Inspector of the N. G. of New Jersey, whose name was suggested by Lieut. Col. Myers, Medical Director of the N. G. N. J., to explain their system of training the Hospital Corps. In the absence of Lieut. Col. Godfrey, Lieut. Col. Myers was called upon for a description. He said:

In the absence of Col. Godfrey I will say we have an ambulance corps in New Jersey. It is an independent body composed of sixty men, commanded by a captain who is a medical officer, and a lieutenant who is not; the latter looking principally after the military part of it. The captain is responsible for the medical training of these men. Each squad is commanded by a sergeant; four of them must be medical graduates, medical cadets, and they must pass an examination for that position. After four years service they are promoted by competitive examination.

Our hospital corps has been severely criticised for two or three encampments. The last was a success. The trouble was in former years, not with the hospital ambulance corps, but many of the old officers who had been in the medical department of the State of New Jersey, and who were utterly unable to get out of the old ruts in which they had been for many years. They went to camp without preparing themselves for this purpose. During the last encampment cases of sickness were left exclusively to the medical officers. The hospital ambulance corps was held responsible. During that whole encampment of three weeks we drilled without a hitch and everybody was thoroughly satisfied, and we consider the hospital corps of New Jersey a perfect success. The medical officers do not bother their heads about the corps. When they are wanted the Colonel simply makes a demand on the Surgeon-General for so many men for the regimental hospital, and they are furnished. We have four company bearers for each

company, who are trained in litter drill and so on. I will state with what success these men have met. There was a change of the detail during every week at our State encampment. Through some mistake by someone, we don't know who, the detail of the hospital and ambulance corps failed to get into camp Saturday for the succeeding week. I, as the medical officer of that encampment, was stuck for a while. However, I made up my mind that the company bearers were ready for the service, and called on the Colonel to furnish me company bearers, and had no trouble with them. I found them just as capable to do their work as the ambulance men, and relied on them until we got sufficient ambulance men, and then the company bearers were sent back to their work.

We are proud we were the first to start this plan, and happy that we made a success of it.

Major Lincoln of Savannah, Ga., being called upon, said:

I was extremely surprised to hear Col. Alden's eulogy of the hospital corps of the State of Georgia, because I know there is no such thing in existence. Whether he has been willfully misinformed, I do not know, but I will stake my existence that there has not been an ambulance or litter drill since the last encampment in June, 1895. The Medical Department of the State is thoroughly well organized, the officers are efficient, they are compelled to pass a rigid examination before any man can obtain a commission, an examination that would shame a good many medical colleges. But in regard to the lower order of hospital sergeants and litter bearers we have a great deal of trouble. We cannot get any one to enlist for that purpose. If they enlist and are detailed for this duty, they say they enlisted for the purpose of carrying a musket, and do not wish to be put into the Hospital Department; and we can't get them to enlist for such service. Right here I would make the suggestion that the solution of this problem will probably be found, in our State at least, in the enlistment of intelligent negroes for hospital drill. They make the best nurses in the world. We have a large number from which to pick, and while amongst us down there there is some reluctance to

command them, yet I think this is passing away, and I am satisfied that we can in this way obtain a hospital corps which could not be excelled anywhere in the United States or Regular Army. Of course, the color line is well drawn, and will take some trouble to overcome. When we go to encampment every year, there are two men detailed from every command to come up there and serve if they want to. They have the choice because they do not enlist for that purpose. Sometimes they come, and we will probably have one tall and one short man, so that the drill is a perfect farce. We have had a sergeant of the U. S. Army at almost every encampment I have been at, but the hospital corps has been a failure, and it will be until some steps are taken as I have suggested. They will never get white men to enlist for that purpose. When they enlist they want to fight.

Surgeon-General H. G. Byers, of Wisconsin:

This subject of hospital corps is one that is of importance, and one to which I have given considerable attention. In short, I believe I have tussled with that subject as Jacob did with the angel, and I haven't got into the Paradise of New Jersey yet. When boys would enlist during the late war, they would say to each other: "Jim, if you get shot I will carry you off, and if I get shot you will carry me off." The result was that every man wounded had two of his comrades to carry him off; and four if a line officer, and six or more if a field officer, to carry him off.

It seems very easy, as we have often been told, to criticise the hospital corps drill, etc., but it is not so easy to conduct it intelligently. I believe that it is of the utmost importance that we have an intelligent and reliable hospital corps with our National Guard organizations, but we find a great deal of difficulty to get what we want. In our State we are authorized to have a hospital corps by the law of the State, but we have not had a Democratic or Republican Governor who has had the moral courage to organize it. We can't seem to divorce ourselves from the politicians. They are all afraid to do anything for the National Guard, and cautiously feel their way as to whether they shall give us aid or not. We have, however, improved in Wisconsin very materially,

as an experience of nearly twenty years permits me to vouch for. When we first went into camp we had no organization, we did not have any medicine supplied, each surgeon had to take his own medicine, pick up a hospital steward, and if any one got sick he had an easy time of it—that is, we let him thoroughly alone. When we undertook to organize a hospital corps, the company officers took advantage of the command to forward the men who could not drill. They were sent to the hospital as first class men to take care of the sick and give first aid to the injured. By calling up our line officers when we asked for a detail and did not mention names, they generally sent us a creditable lot of men, and we put them upon their honor. We say, "Please send so many men from your Company," and as a rule they take pride in sending us good, intelligent men when they are made responsible.

We have at every camp not only lectures, but drill in litters and first aid to the wounded; and this is arranged by sergeants of different regiments—that is, the sergeants are assigned to the different regiments. They have arranged that such a one shall take charge of the hospital corps, and I am happy to say that we are advancing, that we have a very efficient hospital corps in camp, and when emergency comes they are prompt to render aid.

While I would like to live in the State of New Jersey where everything is all right, I don't want to go to Georgia. I think we are educating the people, and that gradually this thing is going to evolute itself into a very respectable condition, and in a few years we will be able to say that Wisconsin has an efficient organized hospital corps.

Vice-President Gihon stated that inasmuch as the Association had heard from Col. Alden, it seemed but fitting that Myles Standish should have something to say.

Captain Standish, of Massachusetts:

The State of Massachusetts mustered in its first man in the ambulance corps, enlisted under the statutes of the State, in January, 1885; which was two years previous to the Army and five or six years previous to New Jersey. We have company bearers who are trained by surgeons of their regiments. Some

regiments are good, some good for nothing. Our ambulance corps, however, is a separate organization. It is the same size as an infantry company in our State, and has a captain and first and second lieutenant, all medical men. The company has fifty-eight enlisted men, seven sergeants and ten corporals. There is no talk about hospital stewards. These men have an armory just the same as any infantry company; they are paid by the State, and are furnished implements, and have a drill every week in the year. They come willingly to enlist. If they stay away three weeks we discharge them and enlist some one else. Not only that, but we do not have any trouble in Massachusetts in having interest in the ambulance corps. The Adjutant General of the State always says to me when the militia are mobilized: "You want to make yourselves in evidence; there is not an organization in the State which does so much to bring credit and appropriations to the National Guard as the work done in public by the ambulance corps," and they always put us to the front.

Three years ago we had a mobilization in the City of Boston. My force was assigned a demonstration on the Common. No special advertisement was made, yet we had an audience looking at our demonstration of 15,000, who came there expressly to see the ambulance corps. If you want to create interest in the ambulance corps, teach them good work and give them every opportunity to do it. Last year we had two large assemblies in Boston, the Masonic and the Knights Templars. The Massachusetts hospital corps volunteered their services, and we had twenty stations along the march. We had our ambulances there, had our flags and had our men. We picked up during the day seventy people suffering from fractures of the thigh, apoplexy, etc., down to injured fingers. These people were all taken care of by the ambulance corps, and the service rendered was considered so efficient by the Commander of one of the organizations from California, that he presented them with a gold medal.

We are well advertised in our State. At the drills of the ambulance corps we have as many witnesses as the State Brigade. You can get your pick of the line, too, after a little, and you can have just as good an organization as any military organization in your State. The one thing is that it must be a separate organi-

zation. It must not be dependent upon the good will of Colonel, upon the good nature of Captain, it must be a separate organization, that is under a surgeon-general, which organization is under the command of its own officers, and which can maintain its own drill; and then when the Brigades go into camp it will be under the charge of the general commanding officer, and the rest of the time it is put under the charge of its own officers. That is the secret of discipline and the secret of success. We get what we want; they have altered the law two or three times to fulfill our requests. The reason is because we demonstrate to the public that we can do what we pretend to. Very few people can appreciate military movements, but every one can appreciate the picking up of a man with a broken leg while a mob is looking on. Put your corps in condition to do good work. Let it do this whenever it can, and the men will be very glad to enlist. You will find you have the people with you, and do not have to depend upon the good will of commanding officers. If the people are with you, you can get exactly what you want from the Legislature.

Major F. J. Woods, of New York, N. Y.:

I have heard a good deal of Pennsylvania and other cities of the Union, and the efficiency of their hospital corps. We have an exceedingly efficient hospital corps in New York. The hospital corps consists of twelve senior men. They are lectured to and drilled every week, sometimes twice a week. We, like other States, have found a great deal of difficulty in getting efficient men in the corps. Generally the Commandant of a company sends a man he does not want in the company.

Recently we have been granted the power of having a separate organization. We are to have twelve men to a regiment, with the same number of hospital stewards and the same number of sergeants. They are to be enlisted directly into the hospital corps of the regiment. It is a separate organization of the regiment. We have just received \$15,000 for its equipment.

Col. Alden then closed the discussion.

President Read having taken the chair announced that there would be a reception at the Union League, to which all were cordially invited, to begin at 9 P.M.

Major O'Neill asked for instruction in regard to a number of credentials he had received from officers from various States, signed by the Governors of the individual States.

Vice-President Gihon moved that the credentials be placed before the Committee on Credentials, and the officers admitted to the courtesies and privileges of the Association. The motion was carried.

President Read suggested that the different delegations be ready to nominate or mention to the President on Wednesday morning their choice for the Committee on Nominations. Therefore, that the States had better communicate with one another as to their several candidates.

Major Harvey read a passage from the constitution relative to the number of votes to which each State was entitled in the Nominating Committee. He said if a State had twenty enrolled members in the Association and but one member was present at the meeting, this member would be privileged to cast three votes, one member being necessary for the first vote cast, and for each additional ten members or major fraction thereof, one vote being allowed.

The President appointed as Auditing Committee, Brigadier General Edward J. Forster, M. V. M., Lt. Colonel Charles M. Woodward, Mich. N. G., and Major J. Wilks O'Neill, Pa. N. G.

THIRD SESSION—WEDNESDAY, MAY 13th, 10 A. M.

The meeting was called to order at 10:20 A.M., by President Read, in Houston Hall, of the University of Pennsylvania, the privileges of which had been extended to the Association by the House Committee, who invited the members to avail themselves of all its accommodations, including the Swimming Pool, Billiard Room, Correspondence Room and other apartments.

Reports from committees were called for and presented.
Executive Committee made no report.

Captain Myles Standish was the only member of the Publication Committee present, and presented a minority report. He said:

As one member of the Committee I wish to say that I never saw the Proceedings until they appeared in print in the Transactions. I was never asked what should be printed. Furthermore, my paper presented at the last meeting was lost and consequently did not appear in print at all; this was exceedingly annoying as I had only the one copy. I want to say in my opinion that a Publication Committee scattered all over the United States is a farce and a failure; and that if we have a Publication Committee it should be in one place, and the editor should see the transactions before publication so that the Committee can work intelligently and make a proper report. But the Publication Committee that does not edit, does not make a contract, does not see any of the papers from one end of the transactions to the other, is a Committee I do not wish to belong to. Therefore I declined to sign my name to any report.

Vice-President Gihon suggested that Captain Standish make his report in writing, which motion was moved and seconded.

Lieut. Chase, of Brookline, Mass., as a member of the Literary Committee, stated that the Chairman was unable to be present, and the Acting Chairman, Col. Myers, of Paterson, N. J., stated that there was no report to make.

The report of the Nominating Committee was passed over until the afternoon session, owing to absence of a list of the members of the committee.

The report of the Committee on Official Recognition of the badge was next called for and read by the Chairman, Major John Van Rensselaer Hoff, U. S. Army.

REPORT OF THE SPECIAL COMMITTEE UPON THE OFFICIAL RECOGNITION OF THE BADGE OF THE ASSOCIATION OF MILITARY SURGEONS, U. S.

At the first meeting held in Chicago, September, 1891, Major C. M. Woodward, Acting Surgeon General Michigan, said: "On the completion of the organization of this Association I desire to call your attention to the advisability of the adoption of some *badge*

or decoration, to be worn by lawful members of this Association on occasions of ceremony. This privilege should not only extend to present members, but to all ex-medical officers who will become members of this Association, as well as to those who may yet become military surgeons." Acting upon this suggestion a committee was appointed, and the present insignia adopted with our motto *Omnia pro patriae caritate.*

As the provision that our badge should be worn upon occasions of ceremony could not become operative until permission therefore had been received from the several state military authorities, and so far as the officers of the Army and Navy are concerned, from Congress, a special committee on official recognition of badge was appointed in 1894, whose duty is to obtain the requisite permission.

Massachusetts, always in advance with a military medical department—able, united and influential, was first to issue the order which officially recognized the Association of Military Surgeons, U. S.

Your Committee cannot refrain from quoting from an unofficial letter of Lieut. Colonel, now Surgeon General Forster's:

BOSTON, May 15th, 1894.

"I enclose you a copy of Special Order 54, which grants the Massachusetts members the right to wear the badge. I send you this copy that you may know we in Massachusetts do not propose to let the grass grow under our feet."

Following this order in 1895 came like authority from the states of Rhode Island, Iowa, Colorado, Washington and the District of Columbia, as reported by your committee at the last meeting of the Association.

Upon receipt of notification of the appointment of this committee on official recognition of the badge October 26th, 1895, a letter was addressed to the Surgeon General of each State as follows, viz:

GOVERNOR'S ISLAND, N. Y., November 8th, 1895.

General—The Association of Military Surgeons of the United States deem it particularly desirable that a specific order be ob-

tained from the Commander-in-Chief of your State forces authorizing medical officers thereof, who are members of the Association, to wear its badge on occasions of ceremony. Such orders are already in force in several states, as for example:

COMMONWEALTH OF MASSACHUSETTS,
ADJUTANT GENERAL'S OFFICE,
BOSTON, May 10th, 1894.

Special Orders, No. 54.

The Association of Military Surgeons of the United States, having requested that the medical officers, M. V. M., members thereof, may be permitted to wear the insignia of said association on occasions of ceremony, permission is hereby granted the medical officers of the Massachusetts Volunteer Militia, entitled thereto by membership therein, to wear the insignia of the Association on uniform dress coat, as requested.

By order of the Commander-in-Chief:

(s) SAMUEL DALTON,
Adjutant General.

The objects of the Association must be well known to you as being both patriotic and professional. The work already done has been of immense value in disseminating a knowledge of military sanitation and unifying our sanitary organization, and it is most desirable that the Association be officially recognized in every State.

Will you please give this matter your personal attention, and inform me of the action taken, as early as practicable?

Very respectfully,

(s) JOHN VAN R. HOFF,
Major and Surg., U. S. Army,
Chairman, etc.

Resulting from this letter was an interesting correspondence for the most part favorable to the request therein contained.

By reference to the last Catalogue at command (1894) it is found that ten States, viz.: Virginia, South Carolina, Georgia,

West Virginia, Mississippi, Texas, Tennessee, Idaho, Arkansas and Utah, have no representatives in our Association, and consequently it could hardly be expected that recognition would be obtained therefrom; nevertheless they were addressed in the hope that thereby their medico-military authorities might be brought to realize the great privileges they were not availing themselves of.

On January 27th we addressed a letter to some influential member in each of the states from which no reply had been received, with the most satisfactory results in several cases.

Your committee takes pleasure in filing with this report an official copy of an order from each of the following States, viz:

*New Hampshire.....	S. O.	No. 40,	A. G. O., Nov.	14, 1895
Massachusetts.....	S. O.	No. 54,	A. G. O., May	10, 1894
Rhode Island.....	G. O.	No. 4,	A. G. O., April	8, 1895
Connecticut.....	G. O.	No. 2,	A. G. O., Jan.	30, 1896
New Jersey.....	G. O.	No. 25,	A. G. O., Dec.	31, 1895
Pennsylvania.....	G. O.	No. 1,	A. G. O., Jan.	8, 1896
Delaware.....	S. O.	No. 10,	A. G. O., Nov.	15, 1895
District of Columbia.....	G. O.	No. 4,	A. G. O., April	17, 1895
Alabama.....	S. O.	No. 50,	A. G. O., Nov.	20, 1895
Michigan.....	G. O.	No. 2,	A. G. O., Feb.	20, 1896
Illinois.....	S. O.	No. 172	A. G. O., Nov.	29, 1895
Indiana.....	G. O.	No. 1,	A. G. O., April	30, 1896
Iowa.....	G. O.	No. 14,	A. G. O., April	8, 1895
Nebraska.....	G. O.	No. 12,	A. G. O., Nov.	22, 1895
Ohio.....	G. O.	No. 3,	A. G. O., Mar.	12, 1896
Wisconsin.....	G. O.	No. 8,	A. G. O., April	8, 1895
Minnesota.....	S. O. [Med. Dept.]	A. G. O., Dec.	2,	1895
North Dakota.....	G. O.	No. 10,	A. G. O., Series,	1895
South Dakota.....	S. O.	No. 20,	A. G. O., Feb.	21, 1893
Colorado.....	G. O.	No. 7,	A. G. O., April	13, 1895
Nevada.....	G. O.	No. 5,	A. G. O., July	10, 1895
Washington.....	G. O.	No. 5,	A. G. O., May	21, 1895
Oregon.....	G. O.	No. 6,	A. G. O., May	11, 1895
California.....	S. O.	No. 5,	A. G. O., Feb.	28, 1896

In all, 24.

* We are officially informed that a regulation authorizing the wearing of the badge will be embodied in the New Hampshire code.

The following named States in which we have members have thus far failed to comply with the request of your committee, viz.:

Vermont, North Carolina, Kentucky, Kansas, New York,
*Florida, Missouri, Maryland, Louisiana, Montana, Wyoming.

We trust that by another year not only will the Association have members in every State in the Union, but that each State will have officially recognized the Association of Military Surgeons, U. S., as a National Medico-Military Organization.

In order to obtain official recognition by the General Government, fruitless efforts have thus far been made. The committee of 1894 caused a joint resolution to be introduced both in the Senate and House of Representatives, but it never emerged from the military committees and died with that Congress. To revive the subject your committee addressed letters to the Surgeon Generals of the Army and Navy as follows, viz.:

GOVERNOR'S ISLAND, N. Y., January 13th, 1896.
THE SURGEON GENERAL, U. S. ARMY, (U. S. NAVY)
WASHINGTON, D. C.

General—The Committee on official recognition of the badge of the Association of Military Surgeons of the United States recently addressed a letter to the Surgeon General of each of the States (copy herewith enclosed) requesting that the medical officers of the State forces, who are members of our Association, be authorized to wear the official badge thereof on occasions of ceremony.

Compliance with this request has been quite general, and no doubt in due time the Association in this way will be officially recognized by each State. Important as is this recognition, the status of the Association would be greatly strengthened by its official recognition by the general government as well, and authority to its officers of the Army and Navy, who are members thereof, to wear the badge of the Association of Military Surgeons of the United States on occasions of ceremony would be all the recognition at present desired.

* We are informed that an order authorizing the wearing of our badge was issued in this State, but no copy of it has been received, though written for repeatedly.

I would respectfully ask that you will take such steps toward the accomplishment of the suggested object as your judgment dictates, and that you will advise this committee as to your action, and what, if anything, it and the Association can do to assist you in accomplishing the desired end.

Very respectfully,

(s) JOHN VAN R. HOFF,

Major and Surgeon, U. S. Army,

Chairman Committee, etc.

To which favorable replies were received, and then in the following communication your committee transferred the affair to the Executive Committee, viz.:

GOVERNOR'S ISLAND, N. Y., January 17th, 1896.

COL. LOUIS W. READ,

Surg.-Gen., N. G., Pa.

President A. M. S. U. S. and Chairman Executive Committee. Norristown, Pa.

General—In order to obtain the official recognition of our Association by the General Government and the several States of the Union, the committee “on official recognition of badge” addressed communications to the Surgeon General of the Army, Navy and each State respectively, copies of which are herewith enclosed. Favorable replies have already been received from seventeen States, and further effort will be made to bring into line at least all the States in whose military organizations there are members of our Association. The Surgeon General of the Army writes: *“I would suggest that your committee draw up a suitable bill, and submit it to the executive committee of the Association of Military Surgeons for approval; and that some one connected with your committee, or with the executive committee of the Association, ask some member of Congress to introduce it, preferably in both houses. It will then be referred to the appropriate committee, and will no doubt be referred by that committee to the Secretary of War and to me for an opinion. It will

* An equally favorable letter was received from the Surgeon General of the Navy.

give me pleasure to approve of the proposed legislation and urge the passage of the bill."

Attempts have heretofore been made by previous committees to this end, and resolutions authorizing the wearing of our badge were introduced in the last Congress, but were smothered in the military committees.

This I presume will always be the case, unless some one on the ground will take an active interest in pushing the resolution through the military committee. I need not urge upon the executive committee the importance of the official recognition of the Association by the General Government and the States, it means much to the Association, and in the event of hostilities more to the Government.

Congress has already furnished a precedent in the joint resolution approved Sept. 25, 1890, published in Par. 1, G. O. 133, A. G. O., Washington, No. 18, 1890, which authorizes the wearing of the badge of the hereditary military societies. We would therefore suggest that the following resolution, or some modification thereof, be presented to Congress by the executive committee of this Association, and that its passage be vigorously urged, viz.:

1. Joint resolution granting permission to officers of the Army and Navy of the United States to wear the badge adopted by the Association of Military Surgeons of the United States.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled: That the distinctive badge adopted by the Association of Military Surgeons of the United States may be worn upon all occasions of ceremony by officers of the Army and Navy of the United States, who are members of said organization.

We venture to ask that the Executive Committee will undertake this part of the work looking to the official recognition of our Association, as its membership is of such character and so located as to insure a speedy passage through Congress of the desired resolution.

With such a law on the U. S. Statutes, the work of the committee on recognition of the badge, among the states which thus far through indifference or disinclination have failed to recognize the Association, will be greatly facilitated.

Trusting that you will submit this by mail or otherwise for the early consideration of the Executive Committee, I remain,

Very respectfully,

(s) JOHN VAN R. HOFF,

Major and Surgeon, U. S. Army,

Chairman Committee, etc.

No reply has thus far been received from the Executive Committee. It is believed that strenuous individual and collective efforts should be made by the members of this Association to secure recognition of it by the Congress of the U. S., and by every State and Territory. It matters little in time of peace, but when war comes, as it soon surely will, then will the value to our country of this Association organized and recognized be inestimable. It is recommended that the committee on recognition of the badge, not necessarily as now constituted, be continued until its work is fully accomplished.

Respectfully submitted with copies of orders and all correspondence.

JOHN VAN R. HOFF,

Major and Surgeon, U. S. Army,

Chairman, etc.

Capt. A. R. Garrett, of Brooklyn, said:

In connection with the report of the Committee on Official Recognition of Badge, I think the various members would be considerably benefited if people who have charge of any legislative work for our benefit would let the members of the Association know. We frequently have opportunities, through our relations with members of the Senate or House, where we could have considerable influence. If they would notify us we would be of very valuable assistance. Failure has occurred repeatedly in measures of this kind, where success would come if a little more attention were paid to details; and if the members were made aware of any particular legislation pending for the benefit of the society, I think it would help materially.

I am sorry our own State (New York) has not paid the attention to this Society that it should have done. The State of New York ought to have been one of the leading ones in this Association, and I deeply regret to see it at the tail end. I think the Association should not recognize the State of New York any more than they can possibly help until the State comes to the help and the benefit of this Association. I feel disgusted that Surg.-Gen. Byers, of Wisconsin, said he would like to call the attention of the Association to the probability that the official badge would come into the hands of some who were not entitled to wear it, and asked for some suggestion to be offered which would obviate this difficulty.

Major Hoff said that the objection spoken of by General Byers is a question for the discipline of the State officers. That is just exactly why the Association wishes these badges recognized as official. Then if officers of a State wear a badge of that kind they will be brought to book for it. If they cease to be officers, of course, they are no longer amenable to the discipline of the State. They can wear the badge then, unless the Association takes means to prevent it. For example a number of societies such as the Cincinnati and the War of 1812, have had special acts passed by State Legislatures to protect their badges from misuse, and it is quite probable the Association of Military Surgeons can prevent this abuse of their badge in course of time. New York has not a representative at the meeting of this Association, excluding myself, as I come from Brooklyn. I have induced three or four other gentlemen to join recently from our part of the country. I hope the Association will leave New York out in appointments until this Society is given proper recognition.

Gen. Forster, of Boston, said:

The question in regard to our badge came before the Executive Committee last evening and the evening before. The Committee passed a resolution and it seems a proper time to take it up for the endorsement of the Association, that is that the President and Secretary of the Association take the necessary steps to have our badge copyrighted.

It was moved that the report of the Committee be adopted, and Committee continued. This was carried.

The Committee on Credentials was continued.

Vice-President Gihon moved that the Secretary should read the report of the resolution alluded to by Gen. Forster.

Major Harvey, Secretary pro tem, said he had not the Minutes of the Executive Committee meeting with him.

And it was thereupon agreed that the motion should be deferred until the afternoon session.

Major Harvey stated that he had been authorized by the Executive Committee to deliver the credentials in his possession to the Committee on Credentials. This was done.

The report on Necrology was deferred until Thursday, May 14th, at the request of Gen. G. A. Bowen, of Woodstock, Conn., Chairman of the Committee. He said the report was ready, but at his hotel, awaiting the inspection and signature of his associates on the Committee, Col. Parkhill, of Colorado, and Major Clark, of Minnesota.

Gen. Forster in behalf of the Auditing Committee asked for further time. The report was deferred until Thursday.

The Local Committee of Arrangements made no report.

Gen. Cook, of Concord, N. H., asked whether it would not be better previous to reading papers to make an announcement of the Nominating Committee and place of next meeting.

Vice-President Gihon replied that the absence of a list of the various members from States prevented this, but the Committee would be called in the afternoon session. In explanation of the missing list Vice-President Gihon read a letter received by him from Secretary Chancellor.

Major Hoff asked whether the roster published in the last proceedings contained a correct list of the members.

President Read replied that there are quite a number of names in that roster that should not be there.

Gen. Forster, of Massachusetts, stated that at the meeting of the Executive Committee last evening and the evening before, some thirty or forty gentlemen were elected members, whose names already appeared in the roster. Vice-President Gihon presented twenty names. He held these names should not be in

the roster until the gentlemen are elected by the Executive Committee. The Committee looked the roster up, and with three exceptions all the names appearing in the book that did not belong there were elected last evening. The roster is nearly correct as far as the new men are concerned. There are, however, some names on it that have been dropped by the Executive Committee.

Vice-President Gihon said:

There are a good many names on that list that have no business there. I have protested in vain against this practice. I have proposed for membership a number of names, but I insist they have no right to be considered members, until they have been formally elected by the Executive Committee.

Some of the gentlemen proposed by me paid their fees immediately after the adjournment in Buffalo last year, and I carried their fees around with me while they were clamoring to know why they were not elected. I tried to impress upon them that they could not be elected until the next meeting of the Executive Committee. Nevertheless, they have appeared in print as already members.

Gen. Forster announced that these gentlemen are now members according to the by-laws of the Association, although they have not been announced to that body.

Vice-President Gihon remarked that though these gentlemen had not been announced to the Association, still the members know who they are. It is a matter the Association ought to understand, that by paying a fee the applicant does not become a member of the Association until his name has been acted upon by the Executive Committee—according to Art. I. Sec. 1 of the By-laws. Secretary Harvey read the list of members elected. Professor Nicolayson, of Christiania, Norway, was then elected corresponding member of the Association by an unanimous vote.

Capt. Myles Standish asked whether an ex-Assistant Surgeon was eligible for membership.

Major Harvey replied that such a person would not be eligible to active membership, but could become an associate member. There has been action taken to place names properly in the

register. The Executive Committee had had that under consideration, and that matter has been settled so that the question brought up by Capt. Standish is not material, because it will settle itself, when the lists are revised as directed by the Executive Committee.

Medical Inspector Wise, U. S. Navy, suggested that perhaps in the election of members the rather tedious method obtaining might be simplified. If a man's name is presented it ought to be acted upon immediately. The applicants certainly do not want them to go over for a year until they are acted upon.

Gen. Forster replied that the names would be acted upon immediately by the Executive Committee.

Captain Jarrett took the floor to say that when he made his remarks concerning the State of New York he was unaware that the Governor had delegated Major R. V. Kipp, of the First Brigade of New York City, who has been present at the various sessions.

Gen. Cook, of New Hampshire, urged the immediate appointment of the Nominating Committee to nominate the officers and select the place of meeting next year. He suggested that the Association should not delay nominating until the list spoken of could be obtained. He proposed that members from the Army and the Navy and the several States should get together and recommend to the President the officers they would like to have as their representatives on the committee.

Capt. Standish:

I would like to state that in previous years the committee acting on nominations had designated the next place of meeting. I move that the usual nominating committee have power to choose the place of meeting next year.

This motion was carried.

Vice-President Gihon suggested that the Association take some action in reference to the invitation accorded them to Houston Hall, the place of meeting this morning. It is a very unique building. It is, in fact, a Students' Club. The whole establishment belongs to the students of the University of Pennsylvania,

and the Association were invited to hold sessions in the hall by the students, at the request of the Trustees. There is everything in the building that is in a well appointed club. They claim to have a larger attendance than any other club in this country, averaging a thousand men daily.

The President presented an invitation from the University of Pennsylvania inviting members to visit the various departments of the institution, and stated that members so desiring would, on making application at the office below, have persons delegated to accompany them. A request was also made by a photographer to take the picture of the Association. A motion to this effect was carried, and Gen. Forster, of Massachusetts, suggested that the picture be of members of the Association only, and not include strangers, hangers on, boys, girls and others, which suggestion was moved and carried.

Capt. Jarrett proposed a vote of thanks be given the students for their invitation to use Houston Hall, and the invitation accepted. This motion was carried with great applause.

The reading of papers was then begun.

Lieutenant Colonel A. A. Woodhull, Deputy Surgeon General U. S. Army, not being present, his paper on "The Better Type of Medical Officers," was read by title.

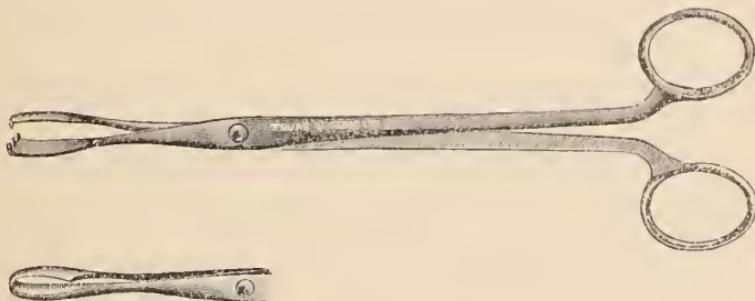
Surgeon-General Nicholas Senn, of Illinois, then exhibited a New Bullet Forceps, and said:

MR. PRESIDENT:

I will not detain you long. I have very few words to say. I simply want to show a new bullet forceps for the extraction of a jacketed bullet. With the introduction of new and improved missiles the old probe has been excluded as an instrument for diagnosis. The American bullet forceps will have its sphere of usefulness in the future, I fear, assigned to the gynecologist. The instrument has become absolutely useless as the new jacketed bullet will escape its grasp.

It has therefore become necessary to devise new bullet forceps. I wish to present this body with an instrument of my own device which I have used numberless times, both as a probe and as an instrument for the grasping and extracting of the jacketed bullet.

I have given this instrument somewhat the shape of a bullet so that it can be used in exploring the bullet track for the missile. When the bullet has been located it is grasped by these two blades, the tip of which is supplied with a very sharp point in order that it may follow the very fine hole of a jacketed bullet, so that it is impossible for a bullet to escape its grasp. Of course, it is equally applicable for the location and extraction of the leaden bullet, but it is especially adapted for the new missile.



The papers of Lt.-Col. Woodhull [and Col. Senn had been held over from the preceding session.

The first paper on the regular order for the day on "The Physiology of Bathing and Swimming," by Surgeon H. G. Beyer, U. S. Navy, was, in his absence, read by title.

The second paper on the programme for the evening, by Lieut. H. L. Chase, Assistant Surgeon Mass. V. M., upon "Baths, Bathing and Swimming for Soldiers," was then read.

Gen. Forster said he hoped the paper read by Lieut. Chase would not be passed by without remarks upon it, at least by those who have some interest in regard to the State of Massachusetts. She has three camp grounds. The State owns a large camp ground, the First Corps of Cadets have both sides of the river at Hingham, the Second Corps of Cadets, one of the small organizations, encamps on one of the ponds where they have opportunities for bathing. The State camp ground at South Framingham has only had opportunity for both bathing and swimming within the last five years, when the Adjutant General at the recommendation of Gen. Forster's predecessor

built a long bath house where they use water (also employed for drinking purposes) simply from the pond back of the camp, and each man is allowed to go there and have a common wash-tub bath. The men like it so much that they have asked for more bathing facilities. The question came up whether there should be a bath-house built directly over the pond. This had been the idea of the Adjutant General. The objection was made that the water would be too cold. However, on Gen. Forster's recommendation facilities will be thus afforded for teaching the art of swimming as well as bathing, which is very necessary to seaboard cities.

Capt. Jarrett said he had been much interested in Lieut. Chase's paper. In New York they are very nicely supplied at the camp ground at Peekskill with bathing facilities. They have in the neighborhood of two hundred baths. After every battalion drill the men rush for the baths. Most of the men bathe every day. For swimming purposes they use a little creek up the Hudson river; they have dug out a good swimming place. They have also in the Armory, probably the only one in the country, a French-tiled swimming bath about 25 by 50 feet, as well as eight shower baths. On the officers' floor there are private bath tubs and needle baths. There is no doubt of the efficiency of the bathing facilities in New York, and the officers do all they can to induce the men not only to swim but to use the bathing facilities as often as possible.

Major Egle, Pa. N. G.:

I am much delighted at Lieut. Chase's paper, and it is from this delight that I have risen from my seat to thank the lieutenant for his able and valuable suggestion. At our regular encampment in Pennsylvania, Mt. Gretna, we have a lake of three acres. It is an artificial lake of pure spring water and affords excellent facilities for bathing. That is the reason I always have held that Mt. Gretna is the typical camp ground of the United States. I think ultimately it will be purchased by the State of Pennsylvania for that purpose, and that alone. In regard to our encampments, the men have free access, of course, to the lake. They have bath-houses, but they prefer swimming in the lake to

solitary baths, and many of the companies march to the lake at sunset and bathe. The water is from four to twenty feet in depth. I may also state that I understand that the Naval Battalion belonging to the National Guard of Pennsylvania, requires every person enlisting in the service to be a swimmer. At every one of our Armory headquarters we have bathing places, but not swimming.

Vice-President Gihon suggested that the Association should give Lieut. Chase permission to publish his paper in some reputable medical journal, with the fact that it was read before the Association appended, and that a sufficient number of copies of the article be furnished by the magazine for distribution among the several States, that is to the different members of the Association, that they may bring it to the notice of the officials in the several National Guards of the State, so that some action can be taken upon it.

Major Egle moved that this be done.

Major Carr, O. N. G., objected to this motion on the ground that it would reflect on the authors presenting later papers, unless they were also asked to publish their papers outside of the Transactions. Major Carr said he considered the paper as excellent as any he had ever listened to before the Association. Furthermore the Transactions would probably appear late in 1896 or early in 1897, which would delay the appearance of Lieutenant Chase's paper very little. Major Egle modified his motion to granting permission to Lieutenant Chase to publish his communication. This was carried.

Medical Inspector Wise, U. S. N., stated that he particularly wanted to hear the paper by Surgeon Beyer, U. S. N., which had been prepared as supplementing the paper just read.

Major Harvey replied that he had received a letter from Surgeon Beyer stating that his paper had been forwarded under a separate cover; but that it had not yet been received.

"A General Consideration of Athletics; their Value in the Training of Soldiers," by First Lieutenant William Allen Brooks, Jr., Assistant Surgeon, Mass. V. M., in the absence of the author, was read by title.

On motion recess was taken at 12:25 p.m., to attend the clinic of Professor J. William White in the Surgical Amphitheater of the University Hospital, and witness a demonstration of the practical use of Roentgen's rays as a diagnostic procedure.

FOURTH SESSION—WEDNESDAY, MAY 13th, 2:30 P M.

The fourth session convened at 2:30 in Houston Hall, and opened with the reading of a paper by Passed Assistant Surgeon Thomas C. Craig, U. S. N., upon "The Vitality of the Cholera Spirillum, in its relation to Certain Fruit Acids."

Dr. Ezra H. Wilson, of Brooklyn, Director of the Hoagland Laboratory:

I had the pleasure of witnessing the experiments detailed to you and can vouch for their accuracy. A member of the Association said to me last evening: "We all cannot be trained bacteriologists, but we would like to know the methods of determining the best way to cope with pathogenic bacteria."

Dr. Craig has told you some of the methods, and we know there are others. Sunlight may be excluded by enclosing cultures in dark closets. As you all know this is very necessary in experimenting because of the destructive power of sunlight upon germs. Dessication in the experiments detailed was avoided by the moist condition of the fruit. Three years ago I had occasion to assist Surgeon General Sternberg in some experimental work we were doing in the Hoagland Laboratory in regard to the vitality of cholera spirillum in sunlight.

The cholera cultures were exposed to direct sunlight. Dessication was eliminated by having cholera culture tubes suspended directly in sunlight and then transferred immediately from these tubes minute by minute and hour by hour. Our experiments showed conclusively that the cholera spirillum would not survive exposure to direct sunlight for more than four hours. This experiment was controlled with a thermometer showing that the temperature never rose up to 28° C. after exposure of ten minutes.

In regard to experiments on dessication, we found that dessication of cholera spirillum placed on silk threads and allowed to dry in dark-closet for forty-eight hours, destroyed the life of cholera spirilla. We find in the fruits the living cholera germ, and it is well to know that sunlight for four hours or dessication for forty-eight hours is effectual in the destruction of this pathogenic organism.

The next paper was read by Major Charles C. Foster, Surgeon Massachusetts V. M., entitled "Notes by a Medical Officer in the East."

Major J. Wilks O'Neill presented to the Association an invitation from Jefferson Medical College to attend a clinic at that institution at 12:30 Thursday.

Major J. K. Weaver moved that the invitation be accepted. The motion was carried.

A paper by Lieut. Col. Charles R. Greenleaf, Deputy Surgeon-General, U. S. A., entitled "Is There a Necessity for Differences Between the Standards of Physical Efficiency in the Regular Army and the National Guards?" was read by title.

Upon request of Major J. Van R. Hoff, Surgeon, U. S. A., his paper upon "What Is the Most Practicable Plan of Sanitary Organization for the United States Army?" was read by title.

Major Harvey stated that he had received a telegram from General J. D. Griffith, Mo. N. G., to the following effect: "Experiments not completed. Ask Convention to defer."

Gen. Griffith's paper on "The Effects of the New Gun in Field Service," was accordingly deferred until the next annual meeting.

Major Valery Havard, Surgeon, U. S. A., read a paper entitled "Notes and Comments on the French Field Sanitary Service, and what we may learn from it."

Vice-President Gihon suggested that as the rest of the papers for the afternoon were similar in character, they should be read and discussion follow.

The following papers were read by title:

"Modern Method of Sewage Disposal as Applicable to Military Posts," by Major A. C. Girard, Surgeon, U. S. A.

"The Illustrated Travois," by Major W. C. Shannon, Surgeon, U. S. A.

Major George W. Adair, Surgeon, U. S. A., read a paper entitled "Some Thoughts on Wheeled Vehicles for the Transport of Wounded."

A paper by Capt. J. M. Banister, Assistant Surgeon, U. S. A., upon "What Standard of Visual Acuity Should be Required of the Enlisted Men of Our Own Military Services?" was read by title.

Commander John C. Wise, Medical Inspector U. S. Navy, read a paper contributed by Lieutenant Charles U. Gravatt, Surgeon, U. S. N., upon the "Methods of Caring for Wounded in Field and Hospital of the Chinese and Japanese Armies."

Col. Allen suggested that the paper by Col. Dallas Bache, Assistant Surgeon-General, U. S. A., upon "Synopsis of a Report on the Medico-Military Arrangements of the Japanese Army in the Field, 1894 and 1895," made to the Director-General, British Army Medical Department, by Surgeon Col. W. Taylor, Army Medical Staff, be read by title.

Major L. C. Carr, Ohio N. G., called the attention of the Association to a litter which Major W. F. de Niedman, Surgeon, Kansas N. G., desired to present to the inspection of the Association. A description of the same was read by Lieut. Herbert A. Arnold, Assistant Surgeon, Pennsylvania N. G.

LITTER, FIRST REGIMENT K. N. G. MODEL 1895.—DIMENSIONS.

Poles, ash, 7 feet 6 inches long, $1\frac{1}{2}$ inches square.

Handles, turned 8 inches long.

Canvas, 6 feet 2 inches long, 2 feet wide, with 1 inch lap each side, leaving 22 inches in the clear. Canvas tacked to the poles in a groove.

Legs 4, of ash, stirrup-shaped, attached to poles by wrought steel plates and bolted to poles by one bolt.

Steel pole plates, wrought steel, 6 inches long, $1\frac{1}{2}$ inches wide, turned on pole $\frac{1}{4}$ inch, bolted on poles 9 inches from the ends.

Stirrups 4, ash, second growth, 6 inches long, $1\frac{1}{2}$ inches wide attached to pole plate by wrought steel clamps.

Braces 2, wrought steel, 20 inches long, $\frac{3}{4}$ inch wide, $\frac{1}{4}$ inch thick.

Brace lock, double clamp, with bow, 4 inches long.

Brace attachment, by bolt to poles in the rear of stirrup, through both the pole plate and rear stirrup clamp.

Leather folding straps 2 inches wide, attached to poles 2 feet from the ends by 4 sunk iron loops, one end riveted firmly in loop, the other running free with buckle attachment to act both as a *stop* as also to take up the slack in the strap. Straps support the body—head and feet—when on litter and strap the same when folded to a button on opposite side.

Slings 2, of webbing, suitable length, leather loops on ends, adjustable readily to any length without a buckle. (Individual.) There is nothing detachable about the litter or capable of being lost.

New features—Wooden stirrup-shaped legs easily replaced and non-expensive, but stronger than any of metal. Braces wrought steel, strong folding lock. Leather Straps non-detachable, preventing the litter from spreading, supporting the weight of head and feet, and used to fasten up the litter when folded. Stirrup attachment to poles, new.

This litter has been in use with the First Regiment K. N. G. since July 1st, 1895.

Respectfully,

W. P. DE NIEDMAN,
Surgeon 1st Regt. K. N. G.

Major Hoff moved that the thanks of the Association be tendered to Major de Niedman for the courtesy of exhibiting his litter and the care he had taken in getting it ready for the occasion. The Association passed a unanimous vote of thanks to Major de Niedman.

President Read then called upon the delegations from the various States and National Services to respond as the roll of States and Services was called, and name their several representatives for the Nominating Committee, which would hold a meeting this evening to elect officers for the following year and decide upon the place of meeting.

The following were accordingly appointed members of the Nominating Committee:

California	Major W. D. McCarthy, of San Francisco.
Connecticut	Lieut.-Col. D. B. Almy, of Norwich.
District of Columbia	Major Geo. Henderson, of Washington.
Georgia	Major F. T. Lincoln, of Savannah.
Illinois	Major T. J. Sullivan, of Chicago.
Iowa	Brig.-Gen. J. T. Priestley, of Des Moines.
Maine	Surgeon-Gen. F. C. Thayer, of Waterville.
Massachusetts	Capt. Myles Standish, of Boston.
Michigan	Lieut.-Col. C. M. Woodward, of Tecumseh.
Minnesota	Surgeon-General J. F. Fulton, of St. Paul.
New Hampshire	Surgeon-Gen. Geo. Cook, of Concord.
New Jersey	Lieut.-Col. C. F. W. Myers, of Paterson.
New York	Captain A. R. Jarrett, of Brooklyn.
Ohio	Capt. J. J. Erwin, of Cleveland.
Pennsylvania	Major J. K. Weaver, of Norristown.
Rhode Island	Lieut.-Col. Chas. H. French, of Pawtucket.
Virginia	Major D. A. Kuyk, of Richmond.
Wisconsin	Major T. W. Evans, of Madison.
United States Army	Col. C. H. Alden, of Washington.
United States Navy	Medical Inspector J. C. Wise, of Washington.

A motion was made and carried to adjourn until Thursday 9 A. M., to meet in the Union League Building.

FIFTH SESSION—THURSDAY, MAY 14th, 9:15 A. M.

The meeting was called to order by President Read, at 9:15 A. M., in the Hall of the Union League.

The President called for report of Committees.

Vice-President Gihon moved that the Reports of Committees be deferred until later in the morning, as many of the members were not present, and that the reading of papers be taken up.

Carried.

The following papers were read by title:

"Problems in Medical Administration, with Solutions; accompanied by suggestions as to the Application of this Method to the Instruction of the Medical Officers of the National Guard," by Colonel Dallas Bache, Assistant Surgeon-General, U. S. A.

"The Epidemiological Features of the Late Epidemics of Plague in China and Cholera in Japan," by Lieutenant W. F. Arnold, P. A. Surgeon, U. S. N.

"Recent Advances in Anthropology Applied to the Physical Examination of Recruits," by Major P. F. Harvey, Surgeon, U. S. A.

Major John Van Rensselaer Hoff, Surgeon, U. S. A., read a paper upon "Outlines of the Sanitary Organization of the Army of Denmark."

Commander John C. Wise, Medical Inspector, U. S. N., read a paper upon "Co-operation in Public Sanitation."

Major Paul R. Brown, U. S. A., read a paper upon "Modern Methods of Anthropometric Identification, so far as the U. S. Soldier is concerned."

Col. C. H. Alden, Asst.-Gen., U. S. Army:

I have been very much interested in the paper read by Major Brown. His explanation of the Bertillon system has been accurate and interesting. There is nothing to be said against this system, and its value and usefulness have been demonstrated all over the world for several years past. It is simply a question of its adaptation for Army purposes. I think the Major, giving him due credit for his excellent paper, is scarcely accurate when he states that the system in use in the Surgeon-General's office is not a scientific one. It can be properly claimed to be a thoroughly scientific one—that is, if one means by "scientific," based upon accurate data, and carried out in a systematic manner.

In 1888 when the necessity of the identification of discharged soldiers became imperative, the question of the best system for the purpose came up in the Surgeon-General's office. The Bertillon system was well known. It had been used in Paris since 1882, and in 1885 it was demonstrated before the International Medical Congress in Rome, and its details were made known. An objection arose to its use in the Surgeon General's office in that its principal employment had been upon criminals. That offered

a very grave objection to its application to men enlisting in the U. S. Army. Even the present system of inspecting a man and recording his marks has met with very strong objection in the press. For the man offering to serve his flag and his country in a spirit of patriotism to be measured and photographed and made to feel that he is treated as a possible deserter and criminal, we see at once would never be submitted to in our country. Our people are not used to submitting to all sorts of measurements, and do not surrender their own individuality as they do abroad.

I have not the slightest doubt if the system had been adopted at the time I speak of by the U. S. Army, the matter would have been taken up in Congress, and the plan objected to by societies and newspapers throughout the country.

As the Major clearly explained, the Bertillon system is based upon three things: first, the anthropometric measurements; secondly, photographs and description of the features; thirdly, a description of the distinctive marks. It occurred to those very ingenious officers, Col. Greenleaf and Major Smart, that perhaps some simpler system could be devised. And they took the third part of the system, modified and thoroughly systematized it until we have to-day a method which can be operated without delay and accurately. The cards are classed first according to race, (black and white), then into nature of the most prominent distinctive marks, such as scars, moles, amputations of finger or toe, tattoo, etc., then as to region of body, and finally as to height. Taking any one of the cards you can in a few minutes find the drawer in which the cards most similar to it may be found. The search is narrowed down to a very few cards.

The results of the system will perhaps be the best indication of its merit. It has been in operation since July, 1891, and there have been some 550 identifications made. After the system got to working, 1892, over 100 identifications were made. They have since become reduced, not through any fault of the system but because the "repeaters have caught on to it," are giving up the game and we don't get as many of them to identify. It is found by this system that there are about twenty-five "repeaters" out of every 1,000 recruits who come into the service. That is a very considerable number of undesirable men that we are able to ex-

clude in this way. It is possible there are some omissions made, but I think there can be very few.

I remember one rather remarkable case in which a man deserted and then tried to re-enlist four times, each of these four times being identified by the cards made by a different Medical officer each time, and each time dishonorably discharged. The last time he was tried and sentenced to three years in a military prison, where he now is.

The system has already grown to very large proportions. There are some 36,000 cards of recruits all told. There are some 4,000 cards of deserters and dishonorably discharged men. The system is carefully watched, and some slight modifications in the classification have been made from time to time. When we first started there were two books in which the main outlines were recorded, one for blue-eyed men and one for brown eyes, but the difficulty of classifying men according to their eyes was so great that it had to be abandoned. We have some lithographic charts giving minute differences in eyes, as they have in the Bertillon system. This is a defect in the Bertillon system because they cannot rely upon the eyes any more than we can. When we have a blue-eyed negro, then, of course, the eye color would be of value.

The anthropometric system of Bertillon does not make very much of the scars and other marks, in fact it seems almost to ignore the important scars on the lower half of the body. In Bertillon's recent work the figure of a man is given stripped to the waist only, and the marks upon the head, back and chest are given. The card in use in the Surgeon-General's office has an outline figure of a man front and back, divided by dotted lines showing regions according to classifications on front of drawers in which cards are placed, and it is very easy to make a dot or mark upon the outline figure, carry a line to the margin and then put the description of the mark, etc., in abbreviations, opposite to it. I think it would be much easier to work by such a plan than simply by the description as of the scars and marks on the Bertillon card. The Army system is a short cut to the Bertillon system. The scars form their own classification, instead of being a subsequent step to the classification made by measures. I am free to say if the people of the United States were educated up to the

self-surrender by which we would be willing to do anything for the benefit of the public, and if we could have one system all over the United States for private individuals, soldiers and prisons it would be an advantage; but there is the strong objection I have indicated, and which I do not think can be overcome, to the adoption of the Bertillon system. The Army system works with success, and until we are educated to submit to a general system of measurements, I think we must follow out the line now in use.

Major Philip F. Harvey, U. S. A.:

As I understand the method of identification we have in the regular army to-day, it is based chiefly upon accidental marks that are found upon the person. The system of Bertillon deals more particularly with the congenital formation of the individual. No two men can possibly be alike in the lengths of their bones, in the conformation of their features, in the shape of their ears; and the system that the French scientist has proposed, while it may be more elaborate and much more difficult to carry out in actual practice, is an advance in my opinion upon the system we are using at present. I think it is more accurate as being more scientific, although the present system in the Army is a scientific system.

I had a paper which I read by title this morning, which is supplementary to this system, and it looks to the prevention of the entrance into the Army of undesirable men by a study and an interpretation of the marks of degeneracy, and by their marks indicating in the individual moral and original defects. Criminal anthropology has arrived to-day at a stage where it is possible to take the marks which are shown upon certain classes of men, and use them for the purpose of estimating that man's character. We have certain shapes of the ear that clearly show a faulty cerebral organization. We have certain lengths of bones and certain peculiarities of the mouth, forms of the face, nose and especially of the head that denote degeneracy. There are certain forms of the head that almost inevitably and infallibly bespeak the criminal, the thief or the murderer. Our recruiting regulations are silent upon the subject of these marks, and I think that there should be some recognition made of them, and I know of no

better way of doing so than by embracing them in the system for measurement and identification and acceptance of recruits, and to officially adopt the scientific teachings of modern anthropometry.

Captain Myles Standish, M. V. M.:

I think this French system is so associated with criminals that it would be difficult or impossible to adopt it in this country. And just here I would like to give a curious example of the wide-spread knowledge of the Bertillon system as a recognizer of criminals. This system was to be adopted in our State prison (Mass.), but the criminals were so indignant that they got up a riot in the State prison.

Captain A. R. Garrett, N. Y. N. G.:

The gentleman in reading his paper especially referred this method to the Regular Army, and perhaps we can all see reasons why it could be adapted particularly to the Army; but in as far as the National Guard is concerned and the particular organization I belong to (N. Y. N. G.), I think it would hardly do to present the system to organizations in our State. I think they would feel at once that they were put under condemnation, and feel it an indignity rather than a benefit to be thus measured and inspected. I can readily see that some form of identification would be advisable in our work, but to adopt any form of identification that comes under the head of identification of criminals would naturally affect the individuality of an American citizen, and make him feel that he was being put on a par with them.

Recently there was an effort made to pass a law in the interests of dairy products in New York, to have the soldiers eat cheese. The first question that was introduced was not only for the National Guard, but for the State prisons to take cheese also for the prisoners. Now, if they had left prisoners out it would have been all right, and the bill would have passed; but the minute it was associated with prisoners the papers jumped on it and so did everybody else.

I believe that our recruits would be lessened so rapidly under the Bertillon system that our Guard would lessen very rapidly,

and that it would be very difficult to keep up to the standard desired.

Major J. Van R. Hoff, U. S. A.:

I would like to ask two questions, first of Colonel Alden: Did he find any congestion of these cards in the Surgeon-General's office? Has there been any difficulty thus far in identifying men by this list, or is there likelihood in the near future of cards overcrowding by this system? And second of Major Brown: Whether the Bertillon system can be carried out in shorter time than our own? It takes on the average at least twenty minutes to make an outline figure with the Army system. If you have ten recruits to examine that means two hundred minutes in addition to the rest of the examination; and the rest brings up time to about three-quarters of an hour with every recruit, and this is a very important matter when a large number of recruits are to be examined.

Colonel Alden:

I am glad Major Hoff has asked this question, for I omitted to mention, although I meant to, the important point as to the possibility of accumulation of cards so as to become unmanageable and delay identification an inconvenient time. We have in use two file cases, each containing twenty drawers, each drawer with a capacity of four hundred cards. There are none near full, nor half full. It has been considered how it would be possible to lessen the number of cards to be overhauled, and it is done in this way. No men are enlisted over thirty years of age. Re-enlistments are not taken into account. We allow a margin of ten years in age. The repeater cannot deceive the recruiting officer by making himself look more than ten years younger. Those cards which show the subjects have reached the age of forty are taken out. Another plan would be in some of the larger regions of body to sub-divide them, thus increasing the number of drawers and lessening the number of cards in each.

Major Hoff:

What would be the result if you had to examine four or five thousand men at once in case of war? Do you think the Army system would continue successful?

Colonel Alden:

My impression is, when it comes to the hurry of war and the immense number of men in service, the confusion and rapidity with which recruits are taken up and sent away would forbid our carrying out the present or any system. There would simply not be time for it.

Major Brown:

One objection has been made by several speakers here to the fact that the Bertillon system is employed for the identification of criminals. This reminds me very much of something I read of Martin Luther. Someone remonstrated with him for playing jig tunes on the violin, and he replied: "I don't see why the Devil should have all the good tunes." That is my reply. I don't see why all the good methods of identification should be given over to criminals.

An aesthetic objection was made that men do not like to have their persons examined and measured thus minutely. On our outline card the most minute mark is recorded. We are supposed to find at least ten to twelve marks on a man. I do not see why if a man had a mole on his left breast I should not put it down.

In regard to the time employed. I can examine a man according to the Bertillon system (and I would say here I have a plant established at my office) in ten minutes, and make all the classifications and all the measurements, and I certainly can't do it as rapidly the other way. The present system of identification in use in the Army will immediately go to pieces in time of great war. It will be impossible to classify in that manner, that is by means of principal scars and marks with the height added.

Colonel Alden:

We classify by regions of the body, also. I cannot understand how it can take less time to take eleven measurements, two photo-

graphs (required by the system of Bertillon), to minutely describe peculiarities of feature, and lastly the distinctive scars and marks, than it does to indicate these scars, etc., on the outline figure card of the Army system.

Major Brown:

Let us presume a man enlisted in the U. S. Army. We examine every part of his body. Bertillon only examines to the waist for aesthetic reasons. I examine that man, I find the principal marks are on his upper extremity. He remains in the service for two years; during that time he receives various injuries, the principal marks on his body cease to be principal and become minor. He re-enlists, his cards are taken out of the Surgeon-General's Office. A man's principal scars can change, and that in my opinion is the greatest objection to the present system in use. The anatomical localization of the marks is all right in our present system.

Colonel Alden:

As to the objection made by Major Brown in regard to the increase of scars and marks on a man on his second enlistment, I would say that would have force if single or only a few scars were considered and noted. Several transcripts are made of the deserter's card, each showing the important regions. When the card of a suspected deserter comes in, you regard not only a few scars but many, so that the old scars cannot escape you even if new ones have been added.

Major Hoff:

Do I understand that transcripts are made?

Colonel Alden:

Three or four transcripts are prepared from each deserter's card, and put in the drawers assigned to the regions respectively.

Major Valery Havard, U. S. A.:

My own experience with our system has not been satisfactory. Some men were referred to me for identification. It was impossible for me to make sure that they were the men originally enlisted.

After a while they voluntarily acknowledged that they were the men. Had they insisted in maintaining they were not the persons, it would have been impossible for a jury to convict them on these cards. So far as the indignity and humiliation are concerned, I think when a man is stripped and his marks and defects noted down it gives as much indignity as he can be subjected to. Therefore I would rather have the more scientific system based on regular anatomical data.

Major Foster, M. V. M.:

While we are on this subject I wish the Society would place itself on record for the benefit of legislation looking to the physical examination of recruits in our State militia. I think something should be done to keep unfit men out of the service. In nine cases out of ten you can't do this. The Adjutants General are unwilling to insist upon such a matter and issue strong orders. The consequence is that nine militia regiments out of ten have many men unfit for even a week's encampment. In my own regiment I discharge several men for inefficiency during every summer encampment. These are simply men whose health breaks down when I can get my hand on them. I discharge men for epileptic fits, hemorrhages, varicose veins and such affections as absolutely disqualify them. Imperfections such as these could not escape notice if the men had been examined. I wish if possible the Association would put itself on record so as to reach the Adjutants General. We have no compulsory examination of recruits. Some of our best commands on their own hook have established such a system.

Major J. K. Weaver, Pa. N. G.:

I would say Pennsylvania examines all recruits for her National Guard. Our examination is based upon that of the Regular Army. Every man is subjected to a physical examination. He is not stripped except partially, but his physical condition so far as his eyes are concerned, hernia, varicose veins and any other deformity or defect that prevent him from making an efficient soldier, is noted, and no man is admitted into the ranks of the Guard of Pennsylvania who has any defect at all that would in any way or at any time render him unfit for service.

Captain Myles Standish, M. V. M.:

Who makes the examination?

Major Weaver:

The surgeon of the regiment.

Captain Standish:

Does he go to the Armory? And if so, does he get any pay?

Major Weaver:

He goes to the Armory and gets no pay. On a certain night in each week a surgeon is on hand, on a drill night.

Captain Standish:

Do you have such things as isolated companies in towns where a surgeon may be many miles from them? Does the surgeon have to pay his fare and other expenses to examine recruits?

Major Weaver:

Our State authorities are very generous to us. They not only grant us transportation to these meetings of the Association of Military Surgeons, but furnish transportation to recruits. They present themselves to the surgeon.

Major J. Van R. Hoff:

Is that the condition of affairs in New York as well?

Colonel N. H. Henry, N. Y. N. G.:

In regard to the State of New York, two or three little points in the papers this morning remind me of experiences New York State has had. The paper read this morning associated with the discussion which has just taken place, is the experience I passed through with the State of New York. The medical officers of the State of New York forced the rule as to physical examination of recruits through. And I would like to make the point here that we cannot accomplish anything by passing resolutions in favor of this measure, and hope in this way to reach the Adjutant General. We must go home and band together, and force through these improvements in the Medical Department. In New York State the

medical officers met together, saw the defects in the service and saw that men must have a physical examination, and that we must have a medical ambulance corps. We were opposed by line officers. The line officers in the National Guard are the same as in the Regular Army; any tendency to give more power or more notice to the medical officers is subject to rather brisk criticism. I had the pleasure of meeting the Adjutant-General of the State of New York, and discussed with him the physical requirements of the National Guard of the State of New York. Some of the Colonels were present, and much to my dismay they made the statement that to establish a physical examination for the National Guard enlistment would simply stop enlistment. Experience has proven entirely different. We have at the present time a modified requirement for physical examination. It is, I believe, pretty generally enforced. While I was still in the service I was able to notice in different Commands, where medical officers were loose in examination, that these Commands were deficient in physical endurance in camp and upon other service. There has been a noticeable improvement in the status of the Guard since this examination. At the present time I think I may say that the commanding officers are the ones most decided in enforcing and encouraging their medical officers to stand up for the status of physical examination.

In regard to the remarks upon physical examination made by a member from Massachusetts, I am really very much surprised. I have always looked upon Massachusetts as being foremost in the Medical Department. If they have to-day no standard of physical examination I would say simply to Massachusetts, let their force be called into service such as Pennsylvania and New York have had, and they will be astonished at the result.

A recess was taken to examine a litter exhibited by Major Valery Havard for Frederick Remington. It belongs to the bicycle wheel class.

Major D. M. Appel, U. S. Army, then exhibited his improved litter sling. He said:

GENTLEMEN:

The sling that is used with the litter at present is a plain band of webbing. It goes back of the neck, down in front of the shoul-

ders, is not attached to the body of the bearer in any way nor to the litter, and when not in use there is nothing to prevent its falling off, and when it is unloaded the first duty of the bearer is to see to the patient, and when the present sling is in use the pressure comes on the spine and pulls the head and shoulders forward. In order to correct these defects I attempted to devise a litter-sling that would not fall off when not in use, and would distribute the pressure generally over the back and shoulders, and not on the spine. This sling consists of two strips of webbing, each one commencing near the axilla on each side, going across the back over the opposite shoulder, and then down in front, terminating in a loop. This loop is to be large and adjustable. The two strips are fastened together under the axilla at such an angle that the more pressed on the closer it gets; they adjust themselves to the body and do not wrinkle. The sling as made now is kept in place by narrow webbing crossing, and allows free play to prevent binding while in use and to make it adjustable for any arm. This sling will fit just as closely to the body of a small man as it will to a large man. The long loops fall downward when you grasp the litter, and as you lift the handle, slip through, and aid in sustaining weight. I submit this sling to the Association with the view of having its merits discussed.

Major Valery Havard, U. S. Army:

I have given some attention to this matter of litter-slings, and have examined this one and been very favorably impressed with it. The ordinary regulation Army sling of webbing, carried over the shoulders, with a buckle and loop at each end, slips up upon the neck of the bearer or laterally, so that after the man takes hold of the handle, it is always necessary for another man to adjust the sling over his shoulders below his neck, which is of course a great objection. With the sling exhibited by Major Appel this objection does not exist. This sling always remains in proper position, which is a great advantage. It is necessary with the present sling to stick the hands under the litter. With the new sling it always remains in position, and it is not necessary to do anything with the loops.

Major Hoff, U. S. A.:

I would like to say a word to the members of the Association on the subject of that litter-sling. If it is proposed to have an *individual* litter-sling, it is the best sling in the world. I have studied the subject of litter-slings for many years, and I have never seen so good a one as Major Appel's, providing we are going to have individual litter-slings. I question, however, when we come to actual service that we will have individual litter-slings, but rather that the litter-slings will be what they should be—a part of the litter, not of the man.

Captain Myles Standish:

I am interested in the study of slings, also, and have been for a long time. I have struggled with it considerably. The present Army sling is about as bad as it can be. You can't put it on and go away with it, you will have someone to fix it, and when you go away it gets up and attempts to saw the back of the man's neck. It is loose and easily lost. I tried to remedy that. We did better than the Army, we made a leather sling so that it will lie flat on the neck, so that it does not slip over the collar and chafe the bearer. We have been very proud of it, and I was puffed with great pride until I came to this meeting and saw the present sling. Major Appel's does not bring pressure on the back of the neck, and it stays on. The present sling brings the burden where it ought to come.

Gen. F. W. Byers, Wis. N. G.:

This sling looks to me a little complicated, that is it takes two men to get it in position. I think if it could be made to slip on by one man it would be better.

Gen. E. J. Forster, M. V. M., moved that the reports of committees be brought up, and desired to present report of the Auditing Committee.

Major Hoff seconded this motion, and it was carried.

Major L. C. Carr, Ohio N. G., presented report of the Treasurer.

SIXTH ANNUAL MEETING OF THE

REPORT OF THE AUDITING COMMITTEE.

PHILADELPHIA, Pa., May 14th, 1896.

We beg leave to submit the following report: We have carefully examined such papers and vouchers as were presented to us for inspection by the treasurer.

We find that the total receipts were \$1,964.08, of which \$88.08 was the balance from the previous account. The expenses have been \$1,767.50, leaving a balance in the hands of the treasurer of \$196.58. The Committee has seen a certified check covering that amount. For every expenditure a proper voucher has been presented.

The Committee would make the recommendation, that a more permanent and satisfactory record of the Treasurer's work should be at hand, and would have been if the detail work of the office had been kept in book form.

Respectfully submitted,

EDWARD J. FORSTER,

Brig. Gen'l and Surg. Gen'l of Mass.

CHARLES M. WOODWARD,

Licut. Col. N. G. of Mich.

J. WILKS O'NEILL,

Asst. Surg. Veteran Corps.

Major Hoff moved that the report be accepted, and that the thanks of the Association be given Major Carr for his services as Treasurer.

Carried.

Gen. E. J. Forster stated that the Executive Committee has passed upon the application of Dr. Wilson, of Brooklyn, who has been appointed successor to Surgeon General Sternberg in the Hoagland Laboratory, and unanimously recommend him for honorary membership, as that is the only position to which he is eligible in the Association.

Carried.

Gen. George Cook, N. H. N. G., reported that the Nominating Committee met last evening and organized, with General Cook as Chairman, and Capt. Myles Standish as Secretary.

As Chairman of the Nominating Committee he then presented the following report:

Your Nominating Committee beg leave to submit the following report:

We recommend as officers for the ensuing year.

For President—Commodore Albert L. Gihon, Medical Director U. S. Navy, (retired.)

For First Vice-President—Brigadier General Edward J. Forster, Surgeon General, M. V. M.

For Second Vice-President—Major John Van Rensselaer Hoff, Surgeon U. S. Army.

For Secretary—Major Herman Burgin, Surgeon Pa. N. G.

For Treasurer—Captain James J. Erwin, Surgeon Ohio N. G.

For Editor—Lieutenant H. Lincoln Chase, Asst.-Surg., Mass. V. M.

We further recommend Columbus, Ohio, as the place of meeting in 1897.

(Signed) GEORGE COOK, *Surgeon General (retired)*

N. H. N. G., Chairman,

MYLES STANDISH, *Capt. and Asst. Surgeon,*

M. V. M., Secretary.

Lieut. Chase begged to be permitted to resign as Editor by reason of pressure of other duties.

The report was unanimously adopted.

Gen. Foster moved that the Secretary be authorized to deposit one ballot as the vote of the Association for the officers nominated by the Committee.

Carried.

Major J. Wilks O'Neill, Pa. N. G., moved that in view of the present indebtedness, some means should be devised by which it might be cleared up, and not carried into 1897. To this end he suggested that a committee of three be appointed by the President to arrange some means of meeting the deficiency, and that the committee be appointed at this meeting.

Motion moved and carried.

Major Harvey stated that he had deposited one ballot for the gentlemen named in the report of the Nominating Committee and under the prevalence of that motion they were duly elected.

Brig. Gen. George A. Bowen, Conn. N. G., then presented the Report of the Committee on Necrology.

Gen. Cook moved that the report be accepted.

Carried.

President Read then said:

GENTLEMEN:

I have a very pleasant duty to perform, and I feel great joy and honor in introducing to you my successor, Commodore Gihon of the Navy, as President of the Association of Military Surgeons of the United States. (Prolonged applause).

Commodore Gihon accepted the Presidency as follows:

GENTLEMEN:

It would be an affectation to say that I am not supremely delighted with the honor and the distinction you have conferred upon me. The Navy perhaps had the right to expect the office. A service which has increased in membership from fifteen or sixteen last year to thirty-five or thirty-six this year has demonstrated its interest in the objects of the Association. It would have been unjust to the Navy not to have given it the office once in seven years. As to the personality of the naval officer who should represent that service, that is another matter. That the official delegates from the navy have seen fit to select me as their representative is something of which I ought to be proud, and I am proud of it. (Applause.) I thank them for this evidence that although I have just gone up on the retired list, they feel that I can worthily represent that service in which I have passed nearly half a century, and thank you who have endorsed their nomination of me and have found me fit to preside over this body.

(Applause.)

Gentlemen, this is perhaps the last dignity of this kind that I shall ever be honored with in my lifetime. When a man has seen three score of years and trenched heavily on the other ten of the allotted period of life, his expectation of the future cannot be

great. All these circumstances make me feel my increased responsibility. But there is one other thing. This dignity has come to me here and at a time when it is particularly grateful. Forty-one years ago, on the first of this month I left Philadelphia and entered the Navy. I had been treated extremely well as a youth by my fellow-citizens, and Philadelphians know what it is to be proud of being a Philadelphia High School boy, and I have had the distinction of being the first Bachelor of Arts that was ever graduated by this institution. I come back forty-one years later and you have said to these Philadelphians, "This man has done his life work well, so well that we have thought it appropriate to invest him with this office." And this makes me realize how much greater are my responsibilities. I make no promises, I only say to you that I will do to the best of my ability all that you expect me to do. (Prolonged Applause.)

Major Harvey presented the Report of the Publication Committee. He said:

GENTLEMEN:

I should like to preface the Report by stating that at the time of the adjournment of the last meeting there was no Publication Committee, and no Publication Committee existed until some months after the adjournment of the last meeting. I had been elected Editor at the Buffalo meeting, and as Editor the papers and reports and various properties pertaining to the Proceedings were sent to me, and I found myself in custody of property which under the Constitution properly belonged to the Publication Committee. On the appointment of the Publication Committee I received a letter from the Chairman of that Committee, asking me to take charge of these papers, and to act for him. I wrote to the junior member of the Committee, and consulted him with reference to the publication, and in every way that I thought it possible to obtain advice and information. In the interests of the Committee I proceeded to arrange the papers for publication. Consequently the report of the Publication Committee is practically the report of the Editor, rendered necessary by the circumstances I have endeavored to detail to you.

REPORT OF PUBLICATION COMMITTEE.

TO THE PRESIDENT AND MEMBERS OF THE ASSOCIATION:

GENTLEMEN:

Your committee beg to report that in determining what portions of the Proceedings were of sufficient general interest to be printed, as required by Sec. 2, of Art. 6 of the by-laws, it was deemed proper to include all the original papers received by it, as each contained matters of interest or importance. The reports of committees were given in all essential details, with appendices, etc. In some cases non-essential accompanying papers and drawings were omitted, in order to reduce the bulk of the volume and curtail expense.

Correspondence with publishers in various parts of the country brought bids from different reputable houses ranging from \$897.50 to upwards of \$1,300 as the price for printing and binding the Proceedings of the fifth annual meeting. Much delay was experienced in collecting the papers and reports and procuring the authority of the proper officers to make contract with the printers. In December, 1895, the papers were all collected, but it was not until the latter part of January, 1896, that authority was obtained for sending the work to the publishers.

The lowest bid was from Earhart & Richardson, of Cincinnati, Ohio, who gave unquestionable references. As the Treasurer is charged under the constitution with the custody and distribution of the Association's publications, it was manifestly an advantage to have this volume brought out in the city in which he resides, as the cost of expressing the entire edition to him would thus be saved. For all these reasons the above named firm was selected to bring out the volume. The Proceedings went forward to Earhart & Richardson, January 24th, 1896, under agreement that the work should be ready for distribution at the expiration of three months. At the date of this report, (April 11th) the work is rapidly nearing completion.

To facilitate the work of future Publication Committees it is respectfully recommended that original papers be delivered to the Secretary at the meeting immediately after they are read, and

reports of committees immediately after they are submitted. And that obituary reports be furnished within two months after meeting. It is thought desirable to continue the Editor as a member of the Publication Committee, preferably its chairman, and for obvious reasons that members who reside near each other be selected to compose the Committee.

Your Committee was unanimously in favor of a binding for Vol. 5, similar to that of Vol. 4, but was compelled at the last moment by reasons of economy to adopt a less expensive one.

J. D. GRIFFITH,

Ex-Brigadier and Surgeon General, N. G. Mo.

P. F. HARVEY,

Major and Surgeon, U. S. Army.

Gen. E. J. Forster moved that the Report be accepted.

Carried.

Gen. Forster suggested that the question of selecting an Editor be referred to the Nominating Committee for report at the afternoon session.

Moved and carried.

Vice-President Gihon on behalf of President Read stated that a beautiful flag had been prepared by the Local Committee of Arrangements, and that the Committee desired the Association to accept the flag as a gift, to be displayed at the place of meeting in the future, and to serve as the flag of the Association. Vice-President Gihon moved that the flag be accepted and the thanks of the Association tendered most heartily to Major J. Wilks O'Neill and his associates of the Committee of Arrangements.

Gen. Cook moved that the flag be adopted by the Association as its *official* flag.

Vice-President Gihon accepted that amendment.

Carried.

Gen. Cook: In this connection I would move a vote of thanks to the Committee of Arrangements, Major O'Neill and his assistants and all others who have contributed so adequately to furnish and pleasure to the members of the Association during their meeting in Philadelphia.

Carried.

Session adjourned at 12 M. to attend a clinic at Jefferson Medical College.

SIXTH SESSION—THURSDAY, MAY 14th, 3 P. M.

President Read called the meeting to order in the Union League Building, at 3:20 P. M.

The following named papers were read by title:

“The Use of Kola for Military Purposes, by Practical Experience.”—By Colonel G. H. Penrose, Surgeon-General, Utah N. G.

“A Plea for Earlier and more Permanent Treatment of the Wounded on or near the Battlefield.” Colonel W. H. Forwood, Deputy Surgeon General, U. S. A.

“The Medical and Surgical Equipment of a 15th Century Military Expedition.” Lieut. H. R. Stiles, Assistant Surgeon, U. S. A.

Lieut. H. A. Arnold, Assistant Surgeon, Pa. N. G., read a paper on “The Treatment of Sick and Injured Civilians at the Summer Camp.”

Captain J. E. Pilcher, Assistant Surgeon, U. S. A., read a paper upon “Methods of Instruction in First Aid.”

Gen. Forster stated that the Association had received no report from the Literary Committee.

Lieut.-Col. Charles F. W. Myers, N. J. N. G., presented the Report of the Literary Committee.

OMAHA, NEB., April 20, 1896.

LIEUT.-COL. E. CHANCELLOR,

Secretary Association Military Surgeons, U. S.,

SIR:—As chairman of the Literary Committee whose duties expire with the sixth annual meeting of the Association, I have the honor to report the virtual close of our work.

The papers whose titles have been reported to the Chairman of the Committee of Arrangements number thirty-three in all, and I am confident that many of them will prove of marked and permanent value.

The membership of your Literary Committee has been widely distributed, and without possibility of association, so that joint work and a common record have not been possible. I have personally on file 92 letters received, and the record of 104 letters written, 44 of which number were requests soliciting papers.

I am informed by Surgeon Boyd, U. S. N., Lieut. Erwin, and Lieut. Chase, other members of the Committee, that their correspondence would materially increase that sum. I regret that Lieut.-Col. Myers, a member of the Committee, did not report. He was, I believe, duly notified by the Secretary.

Very respectfully,

Your obedient servant,

DALLAS BACHE,

Colonel, Asst. Surgeon General, U. S. A., Chairman.

OMAHA, NEBRASKA, April 4, 1896.

Secretary, Association Military Surgeons, U. S., St. Louis, Mo.

SIR:—It has occurred to me that a brief statement of some of the conditions which have seemed important in the course of the work of the present Literary Committee may be interesting to the Association, and productive of good in organizing and forwarding this annual effort.

Undoubtedly all recognize the importance of the product of this special committee, both to the vitality of the annual meeting, and as an exhibit of earnest work in the published proceedings; but I think there is danger of trusting too much to the husbandry of the committee, and again too much to the known willingness and fertility of the soil. A movement such as this Association represents has in it a measure of impulse which may be relied upon to carry it easily forward for a few years, and in that period the voluntary offerings, of literature or material aid, will be sufficient; but that energy must soon be succeeded by a patient effort to well defined ends, if success is to be permanent and significant. To apply this effort to the maintenance of a worthy literature, it is of the first importance, in my conception, to cultivate in the Association a sense of its general responsibility, so that to a Literary Committee may be delegated mainly the literary scheme

and the requisite power of suggestion and request. That is the Committee should begin its labor with a certain confidence that from the year's experience, observation, and work of the many members of the Association, in their varied pursuits, there will be a large unsolicited offering. The Committee should not be under an obligation to pursue members for contributions, so that the Association may be profitably employed at its meeting, and the subsequent published proceedings be worthy of its name. This forcible process will be unproductive in time, and the whole value of spontaneity will be lost. The argument applies equally to medical officers of the National Guard, the Navy, the Army, and to other associated members.

In the more active state organizations there must be in motion special problems of organization, administration, qualification, and equipment, with whose working solutions our whole fellowship is acutely interested. They should be presented unsought.

What is seen of medico-military arrangements abroad, on land or sea; and what is known of improved practice or historical interest through various literature, unless guarded by official silence, should be freely contributed.

There are among us masters of the surgery of emergencies, which is the burden of military surgery; men of research and practice in preventative sanitation; others of mechanical ingenuity in matters pertaining to transport and equipment; to all of whom the Association must look not only for good will but for an active literary solicitude.

If votive offerings from all these sources came to the Committee early in its work, it is easy to see how greatly that work would be lightened, encouraged and systemized.

Then as to the Literary Committee itself. It has seemed to me that if instead of waiting for selection by the incoming President, it could be chosen at one annual meeting to serve for the ensuing year, and chosen so far as practicable, if as to Chairman only, from the members present, there would be a sensible gain in prompt and intelligent action. A committee so selected will have the advantage of communication with members in attendance, of suggestions gained in the discussion of papers, and of personal opportunity in securing individual exertion.

Finally I would solicit for the Committee the nicest official courtesy, not in formality, but in promptness of reply to its requests. With a widely distributed membership some delay in communication is unavoidable; but it should not be prolonged without a stated necessity.

These suggestions are in no sense a report from your Literary Committee, but are given as a personal opinion, and as the result of a member's experience.

Very resectfully,

Your obedient servant,

DALLAS BACHE,

Colonel, Asst. Surgeon General, U. S. A.

Gen. Forster moved that the Report be accepted and referred to the Committee on Publication—that if they think fit they may have all or part of it printed in the next Proceedings.

Carried.

Major Carr stated in regard to binding, that the Executive Committee was prepared to insert advertisements in the Transactions, of course not in the body of the volume, but at the beginning and end. The President and himself have been appointed, so to speak, by the Executive Committee, as supervisors of advertising. They think they can get some advertisements within the coming month in New York. The question of binding was not settled. To bind them in cloth will put the Association to about \$135 cost. It will be furnished in the original paper form at the contract price. It will be remembered the first volume of Transactions was paper covered, the second bound, the third paper cover and the next year cloth. Many of us have had the first, second, third and fourth volumes bound together. We can do it at our own expense. Major Carr thought they should be paper covered and thus save the Association \$135.

Moved, seconded and carried.

Gen. Cook stated that the Nominating Committee had considered the matter of Editor and reported the name of Major Charles C. Foster, of the Massachusetts V. M., who agreed to accept the place, and is an eminently fit man.

Gen. Cook made a motion looking toward the appointing of a Chairman of Transportation Committee for the ensuing year.

Major Carr wished to amend this motion in line with Gen. Cook's suggestion, making the Chairman permanent instead of for the ensuing year.

Gen. Forster made a motion that a Committee on Transportation be appointed, with a Standing Committee of one member to be appointed by the President, that member having power to appoint his own assistants.

Carried.

A paper by Colonel C. Parkhill, Surgeon-General, Colorado N. G., upon "A New Apparatus for Maintaining Apposition of Bones After Resection, or in Fractures with a Tendency to Displacement," was read by title.

A paper by Major Edward Martin, Surgeon Third Regiment, N. G. P., upon "Medical Department of National Guard of Pennsylvania," was read by title.

Major D. M. Appel, Surgeon, U. S. A., presented a paper on "Asbestos Surgical Field Dressings." The dressings were exhibited.

First Lieutenant Robert P. Robins, Asst. Surgeon Pa. N. G., exhibited a new centrifuge.

President Read:

Mr. Vice-President and Gentlemen, permit me to thank you very sincerely for your kindness, and accept my thanks for your assistance and good nature, and to congratulate you upon the success of this meeting. I now have the great pleasure of turning over my duties to my successor.

Commodore Gihon replied that President Read was still President until 12 o'clock that night.

Commodore Gihon as President-elect then announced the Committees for the ensuing year. He said:

In selecting the Committees I have endeavored to recognize all parts of the United States. I do not wish to confine them to any particular locality. It is unavoidable to duplicate in some instances. For instance, the officers of the Association are ex-officio members of the Committee; the ex-officio members are myself from the

Navy, Gen. Forster, from Massachusetts, Major Hoff, of the Army, Major Burgin, from Pennsylvania, Capt. Erwin from Ohio, and Major Foster, from Massachusetts.

The appointed members of the Executive Committee will be:

Brig. Gen. George Cook, Ex-Surgeon-General, N. H. N. G.
Brig. Gen. Frederick W. Byers, Surgeon-General, Wis. N. G.
Lieut.-Col. Charles M. Woodward, Surgeon-General, Mich.

N. G., (retired.)

Major Philip F. Harvey, Surgeon U. S. Army.
Major D. A. Kuyk, Surgeon Virg. N. G.

The ex-Presidents are also ex-officio members of the Executive Committee; they are:

Colonel Nicholas Senn, Surgeon-General, Ill. N. G.
Brigadier-General George M. Sternberg, Surgeon-General U. S. Army.
Colonel Louis W. Read, Surgeon-General Pa. N. G.

I wish to state that this evening the new Executive Committee ought to have an informal meeting, and as many as possible should get together and talk over matters.

The Publication Committee I have appointed with a view of their easy communication with the Editor. This Publication Committee is not a mere nominal affair. They are intended to carefully scrutinize the papers and publish only such as are proper and creditable. The material should be carefully revised, and handed to the Editor. The Editor will have enough to do to read proof and get it in shape, and the duty with which the Publication Committee is entrusted is to thoroughly examine the papers beforehand. I hope in the next volume this will be very carefully attended to.

The Committee consists of:

Lieut. H. Lincoln Chase, Mass. V. M.
Lieut.-Col. Charles H. French, Medical Director, Rhode Island V. M.
Lieut.-Col. Nelson H. Henry, ex-Asst.-Surgeon General N. Y. N. G.

(Of whom the Committee subsequently selected Lieut. Chase to be Chairman.)

They are near enough to communicate without much trouble with the Editor.

The Literary Committee will consist of:

Lieut.-Col. Charles F. W. Myers, Medical Director N. J. N. G.
Major Paul R. Brown, Surgeon U. S. Army.

Lieut.-Col. Leonard W. Almy, Medical Director Conn. N. G.
Commander John C. Wise, Medical Inspector U. S. Navy.

Major Joseph K. Weaver, Surgeon Pa. N. G.

Committee on Recognition of Badge continued by vote of Association. I have appointed as members of that Committee, of which Major John Van Rensselaer Hoff, Surgeon U. S. Army, is Chairman, Captain Arthur R. Jarrett, Asst.-Surgeon, N. Y. N. G.

Committee on Credentials:

Capt. James E. Pilcher, Asst.-Surgeon U. S. Army, with his associates, Major Thos. J. Sullivan, Ill. N. G., and Major Frank T. Lincoln, Ga. N. G.

Committee on Necrology:

Col. Clayton Parkhill, Surgeon-General Colorado N. G.

Major James H. Etheridge, Surgeon Illinois N. G.

Capt. Wm. D. McCarthy, Surgeon California N. G.

Committee on Transportation:

Major A. H. Briggs, Surgeon N. Y. N. G., Buffalo, N. Y.

The Chairman of Committee of Arrangements will be;

Captain H. M. W. Moore, Ohio N. G., 243 East Town Street, Columbus, Ohio.

Commodore Gihon made a motion that the Secretary be directed to publish a list of members in conjunction with the Constitution and By-laws, if they are already in print; if not that he shall print them together for speedy distribution.

Carried.

Major J. Van R. Hoff, U. S. A.:

It will be recalled that in the report of the Committee on Recognition of the Badge twenty-eight states have been recorded, and copies of their recognition are now in the hands of the Secretary, authorizing members of the Association to wear the badge on occasions of ceremony. But the report of the Committee also called attention to the fact that the officers of the regular establishment are not authorized to wear the badge, because that authority can alone come from Congress, and in order to get it it would be necessary to pass a bill through the Senate and House. I have the impression that it can only be done by having someone on the ground. I can see that there will be no objection on the part of Congress, provided someone there says, "Pass it, pass it, pass it." Now the Committee on Recognition of Badge, as constituted to-day, of which I have the honor to be Chairman, is not so placed as to be able to accomplish that object, and so there should be added to that Committee in Washington someone to undertake that part of the work, or the Executive Committee, some members of which are in Washington, should take the work in hand. Certainly it is a very necessary thing to be done.

Commodore Gihon:

These suggestions are good, and if Major Hoff will suggest a resident of Washington, or if someone will volunteer to undertake the work, I shall be glad to add his name.

Major George Henderson, Surgeon-General of the National Guard of the District of Columbia, was so appointed.

Commodore Gihon offered the following resolution:

RESOLVED, That we extend our heartfelt thanks to Col. Louis W. Read, Surgeon-General, Pa. N. G., for his prompt and faithful attendance, his impartial rulings, and his unfailing courtesy as presiding officer during the deliberations of this Association at its sixth annual meeting; and the President-elect having taken the Chair, the motion was carried unanimously, with applause.

Three times three cheers and a tiger were given in honor of Gen. Read.

General Read replied thanking the Association.

On motion the session of the Association was declared adjourned *sine die*.

REPORT OF THE COMMITTEE ON NECROLOGY.

TO THE ASSOCIATION OF MILITARY SURGEONS OF THE UNITED STATES.

GENTLEMEN:

One of the great actuating powers of our lives is the desire to perpetuate ourselves in the memories of our associates and contemporaries; it speaks well for humanity that the present award and its enjoyment is not all that we live for, a good name passed down to successive generations reflects more honor than position or wealth.

It is fitting that those proper adjuncts to our lives, hope and ambition, should so shape our lives as to merit words of commendation, pages of eulogy or monuments of lasting stone when we have passed away.

It is especially fitting that this Association of Military Surgeons should keep a record of and perpetuate the memories of its departed members; for no calling offers less of the enjoyments and emoluments of life than that of the physician and surgeon, replacing them with time devoted to the sufferings of others, self sacrifice and unrequited labor, and this in the name of charity alone, and with it all the ever persistent study and research for scientific truths that he may devote his energies to still better results, but no greater reward. Therefore your Committee on Necrology present to you the names of Brigadier-General H. D. Pickman, Surgeon-General of Montana, and Captain Carter Nelson Berkley Macaulay, U. S. A., for your last tribute of respect to their memories. By the whole action of their lives they have earned not alone this brief mention, but more visible remembrances, which we are without the means of giving.

But after all it is not for the admiration of men that one should live, but for their own intellectual development. We can repeat with Cicero of old "*Brevis a natura nobis vita data est; at memoria bene reditae vitae sempitenna*" (the life given us by nature is short; but the memory of a well spent life is eternal.)

In Memoriam.

BRIGADIER-GENERAL H. DERBY PICKMAN, OF
DILLON, MONTANA.

DIED JANUARY, 22, 1896, AT DIGBY, NOVA SCOTIA.

In an editorial of the Dillon, (Montana), *Tribune* on the death of General Pickman the following occurs:

"Dr. Pickman's death is regretted exceedingly. No greater-hearted man ever lived in the West, and his benefactions were unstinted and heartily bestowed.

No man in distress ever applied to him in vain; he was generous to a fault. His temperament precluded the acquisition of numerous close friends, but those he had he clung to with remarkable fidelity."

We learn from other sources that he was equally tenacious of his love for his country and his profession, ever ready to uphold our flag by action and by words, and devoted much time to the perfection of the Hospital Department of the M. N. G. These traits are always associated; fidelity to friends, fidelity to profession, fidelity to country, what greater comment can be passed on a life?

Brig.-General H. Derby Pickman was born in Salem, Mass., Sept. 1844. His ancestors emigrated from Bristol, England, and settled in that town in 1662; he was of the ninth generation born in this country.

He was of good lineage, on his paternal side he traced his ancestry back to Willoughby de Ersby, an old Norman baron, who came with the conqueror; also on his mother's side to the Pen-

drills, one of whom was noted in English history for having hidden King Charles in an oak tree.

Emily Woodville, (the fair maid of Kent), was a direct descendant of De Ersby, and it is in direct line from her, by her first marriage, that his branch of the family trace their descent. Her first husband was Sir John Grey, and her second husband was Edward IV.

Dr. Pickman received his education in Salem, Mass., graduating in its high school in 1861. In August, 1862, he enlisted in Company A, 50th Mass. Vol. Infantry, and served under Gen. Banks in the New Orleans expedition.

After serving three months over his term of enlistment, he was mustered out, and returned home broken in health. Upon his recovery he again enlisted.

At the close of the war he took up the study of medicine, and graduated from the medical department of Harvard college, with honor, in 1868. After practicing a year in New Brunswick, he went to the Lake Superior copper mining country, and was physician for a mining company until 1876, when he came west to Utah, Idaho, and in the fall of 1883 came to Dillon, Montana, where he continued to reside and practiced his profession, in which report credits him as being remarkably successful, especially in surgical cases.

In 1882 General Pickman was married to Miss Virginia L. Palmer, daughter of Hon. Chas. H. Palmer of Michigan.

He was elected a member of the Montana legislature in 1888, and had the honor of introducing the bill which is now the medical law of the state of Montana. He received from Governor White the position of Brigadier-General and Surgeon-General of the Montana National Guard, and Governor Rickards honored him with the same appointment, which he held at the time of his death. He was a prominent and active member of the state medical association; was also a prominent member of the Masonic fraternity, was a Knight Templar and a Captain General of that order.

In Memoriam.

CAPTAIN CARTER NELSON BERKLEY MACAULEY,
U. S. A.

DIED AT FORT LOGAN, COL., FEBRUARY 6th, 1896.

Captain Carter Nelson Berkley Macauley was the eldest son of Rear Admiral Edward York Macauley, U. S. N., and Josephine McShaine Berkley, only daughter of Carter Nelson Berkley of Edgewood, Virginia. He was born at St. Paul, Minn., July 28th, 1859, and was of a family greatly distinguished in the naval history of our country, was a grand-son of Lieut. Daniel Macauley, U. S. N., a grand nephew of Commodore Charles Stewart Macauley and a great grand nephew of Commodore Charles Stewart.

His boyhood was chiefly passed in New England, where his father was stationed; while living in Boston he received two medals, one silver and one bronze, from the Massachusetts Humane Society for risking his life in saving a man and a boy from drowning in Boston Harbor. He studied medicine in Jefferson Medical College, Philadelphia, and was graduated in 1882, and was appointed Assistant Surgeon in the Army August 10th of the same year. In 1887 he was promoted to Captain. He had served as Post Surgeon at numerous posts, chiefly in the West, and had also seen much field service with the troops in Oklahoma.

Ordered in the public interest from Fort Apache, Arizona, for temporary duty at Fort Logan, Colorado, he contracted epidemic influenza a week after his arrival, and died after a week's illness, at the early age of thirty-six years.

In person, Captain Macauley is represented as particularly attractive, of unusual stature, of handsome face, admirable in carriage and of the most pleasing manners, and a companion

testifies that closer acquaintance served to confirm the first pleasing impressions awakened by his fine physique and courtly bearing. The same friend further says, "He had a marked inclination towards the sentimental side of military life, and was not ashamed to show it. He believed in the influence of environment, and justly thought that as the man who took pride in his surroundings was the better for it, so those who lived under the colors should show by their behavior that they were worthy of their place; his thoughts were never ignoble and his character was beyond reproach."

Another marked feature of Captain Macauley's character was his intense devotion to his kindred and friends, ever placing loyalty to them as one of the duties of life.

He was a member of the Naval Order, The Loyal Legion, Sons of the American Revolution, and of the Society of the War of 1812.

Respectfully submitted on behalf of the Committee,

GEORGE AUSTIN BOWEN, *Chairman.*

MEMBERS IN ATTENDANCE.

PHILADELPHIA, 1896.

Adair, George William,
Adams, Charles Francis,
Almy, Leonard Ballou,
Appel, Daniel Mitchell,

Baker, Washington Hopkins,
Bauer, Louis Demme,
Blood, Robert Allen,
Boardman, Walter,
Bowen, George Austin,
Briggs, Albert Henry,

Carr, Lawrence Carlos,
Castle, Charles Henry,
Cawley, Morris Franklin,

Egle, William Henry,
Emmerling, Karl,
Erwin, James Jay,

Fitzpatrick, Charles,
Forster, Edward Jacob,
Forwood, William Henry,
Foster, Charles Chauncy,
Foster, Romulus Adams,

Gauntt, Franklin,
Gihon, Albert Leary,
Glover, Lawrence L.,

Archibald, O. Wellington,
Arnold, Herbert A.,
Ashenfelter, William J.,

Brinton, John H.,
Brown, Orlando, J.,
Brown, Paul Richard,
Burgin, Herman,
Byers, Frederick W.,
Byrne, Charles C.,

Chase, H. Lincoln,
Cook, George,
Craig, Thomas Canby,

Etheridge, James H.,
Evans, Theodore W.,

Fowler, George Ryerson,
Frazier, Charles Harrison,
French, Charles Henry,
Fulton, John F.,
Fulton, William G.,

Godfrey, E. L. B.,
Green, Charles Oliver,
Greene, Francis V.,

- Halberstadt, George Howell,
Harland, William Guy Bryan,
Harman, George G.,
Harvey, Norman Darrell,
Harvey, Philip Francis,
- Jarrett, Arthur R.,
Jarvis, Nathan S.,
Johnston, James,
- Kuyk, Dirk Adrian,
- LeConte, Robert Grier,
Lincoln, Frank T.,
- McCandless, Alexander A. E.,
McCarthy, William Daniel,
McGill, John D.,
McKim, Robert V.,
Marsh, William H.,
- Neff, George W.,
- O'Neill, James Wilks,
- Peck, George,
Pilcher, James E.,
Potteiger, Jonathan B.,
- Read, Louis W.,
Rhein, John H. W.,
Ritter, F. Horace S.,
Robins, Robert Patterson,
- Sander, Enno,
Scofield, Walter Keeler,
Senn, Nicholas,
Smith, Lawrence Savery,
Standish, Myles,
- Havard, Valery,
Heizmann, Charles Lawrence,
Henderson, George,
Henry, Nelson H.,
Hoff, John VanRensselaer,
- Johnston, William G.,
Johnston, William McCandless,
- Longshore, William R.,
Lutz, Frank J.,
- Martin, Edward,
Moore, Henry McIntyre Worth-
ington,
Mudge, Selden Johnson,
Myers, Charles F. W.,
- Newgarden, George J.,
- Priestley, James Taggart,
Pritchett, Gilbert L.,
- Robinson, Samuel Quincy,
Rockwell, Thomas F.,
Rolle, William Alfred,
- Stayer, Andrew Snowberger,
Sternberg, George Miller,
Stewart, Walter Scott,
Sullivan, Thomas J.,

Tesson, Louis S.,
Thayer, Frederick C.,
Thomson, Archibald G.,

Ward, John M. Broomall,
Weaver, Joseph K.,
Wheaton, Charles A.,
Wilson, Ezra H.,
Wilson, William E.,

Truax, Charles,
Turnbull, Charles Smith,
Turner, William D.,

Wise, John Cropper,
Wood, Frederick J. J.,
Woodward, Charles Meredyth,
Wyman, Walter.

Original Papers.

INSTRUCTION OF THE HOSPITAL OR AMBULANCE CORPS IN THE UNITED STATES AND STATE SERVICES.

BY COLONEL CHARLES H. ALDEN, Assistant Surgeon General U. S. Army.

My purpose is to give some account of what is being done for the instruction of the hospital and ambulance corps of the United States and the State services, of which I think too little is generally known, believing that such an account will afford in itself valuable, perhaps the best, suggestions as to defects in our present work and its improvement. Incidentally I shall offer some remarks on present and proposed methods of instruction.

First let me invite attention to two very interesting and instructive articles on this subject read before the last meeting of the Association. One is on the Instruction of the Hospital Corps of the U. S. Army, by Major H. S. Turrill, Surgeon, Fort Riley, Kansas, treating specially of the work of the Hospital Corps Company of Instruction at that post; and the other on the Instruction of the Hospital Corps at Military Posts, by Captain W. C. Borden, Assistant Surgeon, Fort Snelling, Minnesota, pointing out the importance of a definite system for such instruction. These articles are both highly interesting and instructive, and will, I am sure, receive well merited attention.

My topic naturally divides itself into two distinct parts: first, the instruction of the hospital corps in the U. S. Army, and then of the "hospital corps," "ambulance corps," or "hospital and ambulance corps," as it is variously called, in the State services.

The United States service and State services are so different in many of their features that it is impossible to carry out the same system of instruction for the hospital corps in both. These differences have been somewhat too much lost sight of. Nothing

would be easier, at first sight, than to take the orders and regulations, organization, equipment and instruction of the Medical Department of the U. S. Army, which may be presumed to have been evolved by experience and proved of value, and adopt them for the State services. But it cannot be done, for the conditions in the two services are quite dissimilar.

In the first place, as to the organization of the hospital corps. While the single corps adopted for the U. S. Army is preferable to the regimental detachment in most respects, especially in securing better and more uniform discipline and instruction, it may not always be possible to secure it in the service of a State. In a large State some of the regiments may be very widely separated and never brigaded together. A single hospital corps organized and instructed in the most populous city could not conveniently furnish detachments for them. A regimental organization, which should of course be independent of the line, would therefore seem to be the only one practicable in some instances.

Again, the position in which the hospital corps man is placed in relation to his duties, and the conditions under which he performs them, are widely different in the two services. In the State service the occupation upon which he is dependent for support necessarily occupies almost his entire time, and he is only able to give up an occasional day now and then, and some of his evenings perhaps, or at most a week or so in summer for camp duty, foregoing, possibly, his well earned annual vacation. The United States hospital corps man of course devotes his entire time to his work, and is available at any time for instruction and drill. With the difficulties under which the State hospital corps rests it is a matter of surprise that its members accomplish so much and have attained in some States to such a high degree of proficiency. It is due to the fact that the men who are selected for privates of the hospital corps in the service of the State, being often drugists, dentists, medical students, and even graduates of medicine, are as a rule superior in intelligence to those of like grade in the United States service, and enter into their work with a spirit and energy which perhaps would be less manifest if their whole time had to be devoted to it. I have been informed by the Surgeon General of one of the States that in one of the organizations of

his service, the men originally detailed not being entirely satisfactory, six practicing physicians were secured to fill their places. Of course, nothing of this kind could be possible in the United States service.

Again, the duties required in the services are quite different. The hospital corps man of the U. S. Army habitually serves at a military post, and his work is chiefly in the post hospital. On the Indian frontier, and especially in Arizona and Texas, he goes on scouts and expeditions, and at all posts participates in the annual practice marches.

Within the last few years only has the United States man had any experience in connection with suppression of riots, sharing this last duty with his comrade of the State service. This riot duty is the chief active work of the State forces, and hard and trying work it is at times, as papers read before the Association have shown. The men of the State service go into camp once a year, but not always so often, for a week, participate in occasional parades, and attend at the armories for drill and instruction. The United States hospital corps private must be an all round man; not only must he be a good nurse and skilled in first aid, but he must be able to cook, to have some knowledge of tools, of gardening, and of the care and use of animals. The pharmaceutical and dispensing and all the clerical work, of which there is a large amount, must be done by the hospital corps, the more intelligent and specially trained men being selected for these duties. Much of this sort of work is entirely unnecessary for the hospital corps men of the State services; their duties do not ordinarily require it, nor do they have the time to acquire it; military discipline, prompt obedience, proficiency in litter and ambulance drill and in first aid to the sick and wounded, are all that is needed for their efficiency. We see, therefore, the instruction of United States and the State hospital corps men cannot be considered together. Referring first to the United States service: Those of my hearers who have been in the Medical Department of the Army for ten years or more will undoubtedly remember the difficulties and disadvantages attendant upon the care of the sick and wounded and the administration of the hospital under the old system of employing men who were temporarily detailed from the line, such as the

difficulty of securing good men, the uncertainty of retaining them, etc. They will agree with me, I think, that in no particular has the establishment of a separate hospital corps in 1887 been of greater advantage than in the opportunity given for the instruction of its members, by which more skillful and reliable assistants were provided for the Army Medical Department.

It was mainly for the purposes of instruction, particularly of men entering the hospital corps directly from civil life, that the hospital corps companies of instruction were established in 1891. A secondary but most useful purpose was the formation of depots from which instructed men could be drafted in cases of expeditions, riot duty, or other sudden emergencies. The first company was formed at Fort Riley, Kansas, under the direction of Major J. Van R. Hoff, Surgeon, to whom great credit is due for starting a new scheme and putting it into successful operation. A second company was organized under Major Valery Havard, Surgeon, at Fort D. A. Russell, Wyoming, whose skill and interest in the work soon put it into good working order. This school of instruction for the hospital corps was, in the fall of 1893, transferred to Washington Barracks, D. C., in order that the Eastern Department might be more conveniently supplied with trained men. Each company consists of six or seven non-commissioned officers and about thirty men.

The interesting article of Major H. S. Turrill, Surgeon, who succeeded Major Hoff at Fort Riley, and who is still in command of the hospital corps company there, read at the last meeting, and to which I have already referred, renders an extended account of the course of instruction at that school unnecessary. A brief summary, taken chiefly from a late report, will therefore answer our present purpose.

The school year is divided into two terms, but as men arrive at and depart from the school one at a time all through the year, a regular curriculum is of course much interfered with.

The following are the courses of instruction: Setting -up drill and the manual of the carbine and pistol are first taught, especially to those who have been recruited from civil life. Major Turrill considers that the use of arms is desirable as a part of the setting-up exercise, and argues forcibly that a knowledge of their

use is very important for men liable to serve in Indian campaigns and who may find it necessary to defend themselves and their patients. Instruction by lectures is given to all in first aid, anatomy and physiology, nursing, elements of pharmacy, care of instruments, etc. All the men receive also at least one month's practical instruction in nursing in the wards of the post hospital; they are taught to cook the soldier's ration, to ride, and to care for horses, and are given daily instruction in first aid—which includes litter and ambulance drill as well as the treatment of wounds, accidents and emergencies. In this part of the course an effort is made to carry out the conditions as nearly as possible as they would exist in actual service or on the battle-field; and the men are practiced in pitching and striking tents, and familiarized with the details of camp duty. After several months, four usually, of this instruction in common, those who show aptitude for special duties are specially trained therein. The two dispensaries at the post are utilized for more extended instruction in pharmacy; some men are specially instructed as cooks, others as clerks in the preparation of official papers, others in the use of carpenter's and other tools, and others in ambulance driving. Instruction is held for five days in the week and lasts from 8:30 A. M. to 4 P. M. each day. Saturday the regular weekly inspection of men and quarters is made.

Field work, which the presence of a considerable force of mounted troops stationed at the Cavalry and Light Artillery School renders practicable, is a special and important feature of the instruction at Fort Riley. During the summer, when target practice is going on, a field hospital is formed on the ground, and every hospital corps man serves at least a month therein. Of special importance are the combined manoeuvres and sham battles held every fall, and for which the large military reservation with its greatly diversified surface gives excellent facilities. The hospital corps accompanies each contending force, the lines of relief are organized, and the full activities of the Medical Department on the battle-field are illustrated. Nowhere else than at Fort Riley could this imitation of actual service conditions be made as well, and full advantage of the opportunities is taken.

The Company of Instruction at Washington Barracks which was organized in 1893 when that at Fort D. A. Russell was discontinued, has been in charge of Major J. K. Corson, Surgeon, and his successor Major G. W. Adair, Surgeon, the immediate command being held first by Captain J. M. Cabell, Assistant Surgeon, and then by Captain Frank R. Keefer, Assistant Surgeon. The officers connected with the Company have been most painstaking and faithful, and the results have been highly satisfactory.

The courses of instruction given at this school are essentially the same as those at Fort Riley, but a few differences may be noted. The setting-up exercises, specially for the recruits from civil life, but in which all are practiced to some extent, include calisthenics, the school of the soldier, but no drill with arms. This last is unnecessary, as men from this school are not likely to have to serve with a force operating against Indians. Litter and ambulance drill and first aid are prominent features of the course. The latter is treated with great fullness, and the men are made familiar by practical exercises with every variety of accident and injury, and the appropriate treatment. Bandaging is taught thoroughly. The men are familiarized with the articles on the supply table of the Medical Department, with instruments and their proper care. All are given some instruction in handling the more common medicines and in the more common operations in the dispensary, and all acquire a knowledge of simple cookery. Each receives instruction in nursing in the wards of the post hospital. Recitations are held in first aid and nursing. It should be noted that first-aid instruction involves the elements of anatomy, particularly of the osseous and circulatory systems. Men especially desirous and capable of advancement are taught advanced pharmacy, preparations of dressings, assistance in operations, and the making out of official papers. Those showing aptitude for culinary work are given special instruction in the kitchen.

The facilities for practical instruction in field work are not as great at Washington Barracks as at Fort Riley, but the Company is fully instructed in pitching and striking tents and other camp duties; and the annual detachment of a part of the garrison for target practice and on marches is utilized for field work. The

daily instruction extends from 9 A. M. to 4 P. M. for five days of the week.

There are some points in connection with the instruction at the hospital corps companies at Fort Riley and Washington Barracks which it is well to consider. Some little misapprehension exists, apparently, on the part of medical officers in regard to this matter. Too much is expected of these schools, from a want of consideration of the conditions, and not enough credit is given for the excellent work they have done and are doing. It may seem to some that the schools have not done all that is possible in training the men in the corps—that there are not as many hospital corps men at the military posts that have been trained at the schools as there might be. As a matter of fact, over four hundred men have been trained at the schools since their establishment in the fall of 1891, scarce four and one-half years ago. That a greater number of men have not been sent to the schools is due to several causes. In frequent instances the medical officer makes application for the transfer of a private from the line to his hospital corps detachment, instead of having the vacancy supplied from the nearest company of instruction, because he knows the applicant and thinks he has some special qualifications for the place. Such applications are usually granted. Again, in the case of cooks and gardeners, it is impossible to supply the demand, especially for cooks, for all the ninety garrisoned posts. Some men are trained as cooks at Fort Riley and Washington Barracks, but a large number have to be transferred directly from the line. Then, too, men who have served long and faithfully in the hospital corps are re-enlisted, although they have not been trained with the hospital corps company.

Moreover, the great distance of some of the posts from the schools, and the necessity of economizing the transportation appropriation, render it impossible to supply some posts from the companies. One might say that it would cost no more to send a hospital corps man to a distant post than to send a recruit to replace the line private who was transferred to the hospital corps detachment there, and this objection would be valid but for the fact that the regiments are now recruited largely from the region in which they are stationed. There are eight posts 2,000 miles

distant, nine 1,500 miles distant, and twenty-two 1,000 miles distant from the nearest company of instruction.

Disappointment has sometimes been expressed that men more highly trained in nursing are not turned out from the schools, but it must be remembered that the facilities for a training school such as are attached to the large civil hospitals in cities do not exist at military posts. The hospitals at the schools are not large, and the beds are comparatively few, and no great variety of disease and injury is found in them. Even if the facilities existed, it would hardly be possible to keep men as long under instruction as they are held at a civil training school.

It should be borne in mind also that the instruction at the hospital corps companies cannot be complete. It is unfair to expect that the man received at the post from the school shall be an accomplished nurse or cook and equal to any emergency, and that no more instruction or drill is necessary. Unless the surgeon of the post continues this instruction by daily, patient, painstaking effort, the man will inevitably deteriorate. The instruction given at the post is actually the more important, as it can be continued indefinitely. If the surgeon wants a good assistant, it is largely within his power to make one. Then, too, the rotation of men of the hospital corps detachment in their work so that all may become instructed, at least to a useful extent, in nursing and in cooking, is too much neglected. A surgeon sometimes calls urgently for a nurse or cook on account of the death or discharge of his skilled man. This difficulty would have been avoided if he had placed another man under instruction who could take the vacated place.

I desire to commend to your attention the very suggestive article by Captain W. C. Borden, Assistant Surgeon U. S. Army, on "Instruction of the Hospital Corps at Military Posts," already referred to. The importance of methodical and systematic instruction at the military post is there well set forth. It cannot be too strongly insisted on, and yet I cannot quite agree with that writer in the elaborate programme he gives, though it offers valuable suggestions to the instructor. He would seem to have met with much more intelligent men in the hospital corps than it has been my fortune to command, and he proposes to carry the

theoretical instruction in anatomy, physiology and other branches to a much further degree than has been found possible in my experience. My belief is that the instruction to the average hospital corps man must be by object lesson chiefly. It must be plain, simple and practical, or the instructor will not keep his attention and the instructions will not be remembered; and it is useless to tell him about the processes of nutrition, secretion, excretion, and the like. The instruction of those ambitious of promotion can be carried further, but these men are few. Captain Borden advises, if I understand him correctly, that a definite programme shall be laid down by higher authority which shall be obligatory upon all surgeons of posts in the instruction of their detachments. I doubt the advisability of this. The climatic conditions vary so much at military posts in our country, the size of detachments and the nature of their duties vary so greatly, that an order of daily instruction that would suit one post would be inapplicable at another. There is a little too much disposition to think that in military affairs every difficulty can be met by publishing an order. Certainly there is now full authority under existing regulations for the surgeon to institute and carry out a system of instruction adapted to the special circumstances of his post and the capacity of his men. Is it not better to stimulate individual effort on the part of medical officers and give them freedom to carry out individual ideas and plans? May there not be a distinct advantage in the instruction of the detachment at a post being varied by the coming of a new medical officer? A medical officer who does not take interest enough in his duties, in the welfare of his patients, and in the orderly administration of his hospital, to instruct his men, is not likely to do it satisfactorily under the compulsion of orders.

In turning now to the instruction of the hospital corps in the State services, which I have noted is necessarily unlike that required in the United States service, I do not feel myself fitted or called upon to say exactly what this should be. The medical officers of the State services who have direction of this matter are thoroughly competent to decide what is best for themselves. The State medical officers include among them some of the most able surgeons and general practitioners in the country, many of

them of far greater professional reputation than their colleagues of the United States service, and it needs only for them to attack the problem of the best instruction of their hospital corps with the energy that has made them successful in private practice to accomplish all that is needed.

The best plan will be to give you a summary of what is being done, as far as I have been able to learn, in the several States in regard to the instruction of the hospital or ambulance corps. The example of the methods pursued in the older States and in those whose National Guard and Medical Department have been more highly organized will be the best indication of what it is possible to do and the best incentive to those who have not for various reasons been able to bring their own service up to the high standard that has been attained by the most advanced.

I know well the difficulties and hindrances that often, and indeed in most cases, attend the development of the Medical Department of the State services. There is the difficulty of obtaining legislation putting the Department upon a proper footing. Many States, especially the agricultural States, are very reluctant to create and support adequately a National Guard. Then, too, there is almost always great difficulty in obtaining funds for material for outfitting the Medical Department. It does not follow, therefore, because a State's medical service has not reached the desired standard of efficiency, that its medical men are not alive to its wants or that they are deficient in energetic efforts to improve it. Persistent, well directed effort will, however, in the end be successful.

My information in regard to the Medical Department of the State services is derived partly from letters received from the Surgeons General and other medical officers of the respective States and partly from the statements compiled in the Military Information Bureau of the War Department, published in 1895, on "The Organized Militia of the United States."

The organization we are considering is called "hospital corps" or "ambulance corps," sometimes "hospital and ambulance corps," but the duties are the same.

A corps independent of the regiments exists in five States, namely: Maine, Massachusetts, New Jersey, the District of Columbia and Georgia.

In thirteen States and Territories there is a hospital corps attached to each regiment and forming part of its organization. These are Vermont, Connecticut, Rhode Island, New York, Pennsylvania, Ohio, Illinois, Indiana, Iowa, Minnesota, Missouri, Oregon and Arizona.

Virginia has a hospital corps in one regiment only.

In Michigan, Wisconsin, Kansas, California and Texas men are detailed for hospital corps duty at the encampments only.

In New Hampshire a hospital corps has been authorized, but I think not yet organized.

I will take up the States in which most attention has been paid to the instruction of the hospital corps—geographically.

The separate hospital corps of Maine dates from 1891. Monthly drills are held throughout the year, and weekly ones for some time prior to the annual encampment. On these occasions lectures are delivered by medical officers. The annual encampment gives opportunity for more extended field work.

To Massachusetts probably belongs the credit of having had the first hospital corps, here called Ambulance Corps, it having been organized in 1885, two years prior to the establishment of such an organization in the U. S. Army. It is an independent corps, consisting of one captain, two lieutenants and fifty-eight men. Captain Myles Standish, who commands the Ambulance Corps of the Massachusetts Volunteer Militia, and whom we all know as an active member of this Association, read a very interesting paper on the organization, equipment, instruction and drill of his corps, at the meeting in 1894. I need not, therefore, go into the subject at length, but wish only to invite attention to the methods of instruction. At the evening meeting for instruction, held weekly during the winter I believe, the following programme is carried out:

1. Ten minute quiz conducted by a sergeant.
2. A twenty- or thirty-minute lecture upon some appropriate subject.
3. A practical demonstration of some splint or bandage by a private, who has prepared himself beforehand.
4. Military drill, including stretcher work, for one-half hour.

During the summer encampments, field work, such as improvising stretchers, ambulance work, etc., is practiced.

In Rhode Island weekly instructions of the regimental hospital corps are held, lectures being given one week and demonstrations in first aid and litter drill the next. The corps is newly organized, but great interest is being manifested.

In Connecticut fortnightly lectures of an hour each, on anatomy, physiology, hygiene, emergencies, etc., are given by the regimental medical officer to the members of the hospital corp. Each lecture is followed by one hour's drill in litter exercise, ambulance drill and first aid. At the summer encampment the men are drilled every day.

In the National Guard of the State of New York the hospital corps men (who are regimental) are instructed by the surgeons in simple anatomy and physiology, first aid and treatment of emergencies, the action of the more common remedies, this instruction being given by weekly lectures and demonstrations from October to June. A special feature of the work in this State is the examination held at the close of each season, those most proficient receiving a medal. This examination must be passed each year.

The hospital and ambulance corps of the State of New Jersey, and in fact its whole Medical Department, seem to be organized, I may note in passing, very closely on that of the United States Army. Its Regulations are largely taken from the Army Regulations. Weekly drills are held and instruction given by lectures and demonstrations on the usual subjects, the men being examined from time to time as to their proficiency.

I have no detailed information as to the instructions given in the hospital corps of the National Guard of Pennsylvania, but it may fairly be presumed, from the high degree of efficiency of the Guard and its Medical Department and the many able medical officers connected with it, that this duty is zealously performed. As we are here in the chief city of the State, we may hope to hear something on this subject during the present meeting.*

*NOTE—From information received after this paper was read, it appears that the instruction of the hospital corps in the state of Pennsylvania is as thoroughly carried on as circumstances permit. In the larger cities where there are full regimental organizations regular courses of instruction by lectures as well as drills are given to the corps by medical officers. Outside the larger cities, where it is impracticable to get the men together except at the annual encampment, their instruction is necessarily limited to this occasion.

In Virginia there is no organized hospital corps, but one has been formed in the First Regiment at Richmond, and Major Kuyk, its Surgeon, has done excellent work in its formation and instruction. In addition to the usual branches on which instruction is given to the detachment, the outlines of physical diagnosis and the properties of the more commonly used medicines are taught. Major Kuyk wrote me in regard to a scheme for an Annual Encampment of Hospital Corps from different States with a view to comparison of methods of instruction, competitive drills, etc. Such an encampment would undoubtedly be of great service. The Major informed me that he hoped to be present at this meeting and to present his plan in person.

Georgia has an independent hospital and ambulance corps of twelve stewards and thirty-four privates. Information received from the Surgeon-General of the State indicates that excellent work has been done in organizing this corps. The printed regulations follow those of the U. S. Army as far as practicable. The usual drills and instruction are given.

The hospital corps of the State of Ohio is regimental, and the instruction given by the surgeons is essentially the same as in most States. I am informed that several of the members of one regimental hospital corps are regularly on duty at the Cincinnati Hospital Ambulance Station. This suggests a method of attaining proficiency that might be carried out in other cities where there are large hospitals.

The Indiana hospital corps, now regimental, will probably soon be consolidated into one corps. A peculiar feature is that by law its members must be physicians, medical students or pharmacists. It is evident that the instruction of the corps is well cared for, but I have no details of the methods pursued.

Although Wisconsin has as yet no organized hospital corps, it is evident from reports received that very considerable attention is paid to the instruction of men detailed at the summer camps, and even of the squads attached to the local companies at their homes, as I am informed that some of these squads are made available to give relief in cases of fires, etc.

The hospital corps men of the Iowa National Guard are attached to regiments, and some at least are instructed by lectures

semi-monthly by the medical officers, and drilled weekly by the stewards. The summer encampments afford opportunities for more practical instruction, of which full advantage is taken.

By a recent law Minnesota has a hospital corps of men detailed from companies but independent of them. They are given regular drill and instruction, more particularly at the State camp grounds, at which there is a well organized Hospital Department.

Kansas is one of the States I have referred to in which the development of the Medical Department of the National Guard has been much hindered by want of legislation and appropriations. Major de Niedman, Surgeon, First Regiment, and his colleagues are entitled to great credit for their work under difficulties; and instruction, especially in camp, is faithfully carried out with appliances largely contributed by their own means. The men are taught cooking also, as the Kansas militiaman subsists on his ration.

The State of Missouri has a regimental hospital corps containing a number of graduates in medicine. As a matter of course they must be well instructed and efficient.

The Surgeon General of Texas informs me that, while there is no regularly organized corps, detailed men are thoroughly instructed at the encampments.

I cannot close this necessarily imperfect sketch without drawing attention to the great benefit this Association of Military Surgeons has been both to the national and State services. I have reason to know from my correspondence that great progress has been made since the establishment of this society, due in part, I have no doubt, to the information imparted at our meetings and by its published transactions.

SOME SUGGESTIONS FOR THE GOOD OF THE HOSPITAL CORPS.

BY MAJOR DIRK A. KUYK, Surgeon, Virginia Volunteer Infantry.

As the result of some correspondence, Col. C. H. Alden honored me with an invitation to read a paper before the Association of Military Surgeons, setting forth some of my views, as expressed in one of my letters, for the advancement of the interest and efficiency of the Hospital Corps and its members, especially those enlisted in the volunteer service.

In the State of Virginia, which I have the honor to represent before this distinguished body, the Hospital Corps is a military adjunct of comparatively recent date and is not a regularly organized or recognized organization, existing rather as the fancy of the commanding officer of a regiment than as a legal or compulsory body, its members being usually assigned to some of the weaker companies; hence it receives no support from the State and but little encouragement from the citizens.

The rank and file as a rule do not appreciate the importance of the corps, hence it gets but little encouragement from them, and by many of them is looked upon as a sort of supernumerary appendage. Thus the private of the Hospital Corps finds his lot rather hard, and it is rather difficult to hold him, and he resigns or asks for transfer as soon as possible; it is equally difficult to obtain recruits, especially such as are desirable—men above the average in mental and physical capacity—as there is nothing to offer them as a reward for their higher attainments; they must remain on a level with the private in the file, whose sole duty it is to shoulder a musket or march at command, or if need be, perform the most menial duties or the chores about the camp.

As in civil life so in military life, a man should be judged and rewarded according to his qualifications or his attainments. The private of the Hospital Corps must first of all be a good soldier; then to this he must add work and study unknown to the ordinary private; he thus rises to a higher sphere of mental activity and qualification, soon he becomes a trained nurse capable of performing any duty—and many would make pretty fair doctors—could at least do good work in the absence of a regular medical officer, yet his ability is not recognized, and he has nothing to strive for. Consequently he stagnates, falling into purely routine habits. Would any of us work, study, or endeavor to solve the mysteries of nature, were it not for the sure reward that awaits the successful, and the plaudits of an admiring host of human beings? I submit, then, that the private of the Hospital Corps should be encouraged in his labors by giving him some rank, title, or mark of distinction that will designate his arm of service and his rank more distinctly than that now in use; he should also be better paid than the ordinary private, and for every term of three years consecutive service he should receive an additional per centum, for certainly with his length of service his experience increases, and his services become more valuable.

Stimulated by rank, remuneration and position and with the possibility of promotion ever before him, the private of the Hospital Corps would attain a degree of proficiency heretofore undreamed of or thought possible.

The only way to develop the good that's in a human being is to stimulate his ambition and to offer the opportunity to satisfy it, otherwise improvement is impossible.

All men recognize the importance of the expression and exchange of opinion, and the benefits resulting therefrom, such as occurs especially during the meetings of societies, for whatever purpose, whether of medicine or of art; an idea or a plan is suggested, some one improves upon it until the scheme is crystalized and put into working shape.

Would it not likewise be beneficial for the members of the Hospital Corps and to the interest of the Corps as an organization to have a joint annual encampment of several organizations from

different states, for study, work and instruction and a little recreation as well?

For instance arrangements could be made one year by the medical officers of Virginia to have an encampment at some conveniently located situation, invitations should be sent to the commanders of the corps of the several states nearest, giving terms of transportation and the approximate cost per man for the entire course, to last say four or five days; a programme for the encampment should be prepared so that no time will be lost. Another year the medical officers of Maryland would arrange for an encampment and so on in rotation; in this manner the men would be aroused to greater activity, in study and work, and interest kept alive by the anticipation of a visit each year to new locations. Each organization would strive to perfect itself by the friendly rivalry thus engendered and I have no doubt much improvement made and many good suggestions advanced by the men themselves.

At any rate a few days might thus be pleasantly and profitably spent, and all would feel better for the new acquaintances made and for the outing.

This is, of course, a very crude and incomplete sketch of a plan that could—and I hope will—be much improved upon, but the limited time at my disposal prevents one more in detail. I must apologize for this crude and disconnected paper, and yet I hope that it will strike a responsive chord in some one better suited to carry my suggestions into effect and to a successful culmination.

THE ANNUAL ENCAMPMENT, AND WHAT IT TEACHES TO THE SURGEON OF THE NATIONAL GUARD.

BY CAPTAIN J. J. ERWIN, Assistant Surgeon, O. N. G.

To the casual observation of the Military Surgeon, there will appear many features of resemblance between the camps of the National Guard of the present, and those of the Volunteer Soldiers in the early days of the Civil War. Coming as these men do, from various vocations in life, they bring with them their habits and susceptibilities to disease, which the change of environment pertaining to the new life seldom fails to develop; and we have displayed to us those weaknesses which are common to man's individuality.

Observing more closely, we perceive that with the latter, time was given in camp before going to the front, to determine the qualifications of the men for a soldier's life, and opportunity was afforded for weeding out the weak, and disposing of the maligners, shirks and tail-enders, on whom no reliance could be placed when duty was required. With the former, we find the time too short to determine with much satisfaction the quality of soldierly material of which these forces are composed.

While this is true when considering the personnel of the "rank and file," there is also developed a greater necessity for a more careful observance in the selection of enthusiastic, practical, scientific men, who are to fill the responsible positions of Surgeons of the National Guard, one of whose duties it should be to recommend to the commandants of companies, for discharges, all such men whose hospital records had shown them to be of doubtful value to the service.

To aid them in this work, record books of the hospitals, wherein should be noted the data of those who appear annually for relief,

and where a special notation should be made of those who are afflicted in a manner that would render them unfit for a soldier's duty, etc.—should be carefully kept at each encampment. This would furnish an excellent means through which to determine who are the weak ones, and an evidence which would indicate those who would shirk duty on a pretense of sickness. It would seem that any captain who actually had the best interest of his company at heart, would be only too willing to act on such a suggestion as would rid him of this material, and improve in a substantial way the working force of his command.

The means of support to the National Guard of Ohio, renders a physical examination to qualify for enlistment in the ranks almost beyond consideration. Any practice to the contrary being at the instance of the individual command; notably, the First Infantry O. N. G., where the requirements for enlistments have been brought fully up to those of the U. S. Army service. Men who will devote their time and private means, and do all the work of a soldier, just for patriotism and social alliances, must of necessity come from a limited class justly termed "military fanatics," and their number being usually insufficient, until a more substantial appreciation is shown for their services, the plan as above stated for rectifying the conditions seems to be the one most feasible.

But, while this is true of the common soldiers, there is a feature of honor and dignity which accompanies each promotion, and which is augmented with each advancement. This, being recognized by all who are willing to assume such increased responsibility, should carry with it sufficient additional respect to make the candidate, on the occasion of his first advancement, willing to submit to a physical examination. This should apply not only to those who are promoted on account of meritorious duty, but also to those who receive warrants or commissions at the time of their entrance into the service. Every officer should be sound mentally, physically and morally, for the associations of the citizen soldiery partake much of a social cast, and no ignorant or immoral officer will ever succeed in raising the intellectual or social standing of his command above the sphere in which himself is cast, and ignorance and immorality are the forerunners of dis-

ease, thus becoming potent sources from which the hospitals in our annual camps are abundantly supplied.

The duties of a Surgeon of the Guard are of greater importance than it would seem that some of those who have assumed such responsibilities had previously comprehended, or have subsequently discovered. Professional qualifications are not the only prerequisites. A man to be a successful military surgeon must be a successful man, with capabilities and special tact in military work. No surgeon can neglect, during the intervening time between camps, the education, drill and discipline of those enlisted under his command, and then go into camp prepared to do the work required of his force. Not only should he not return to his private practice with such a manifestation of negligence, but he should not give only an occasional, casual attention to this specialty of his work. If he would have his department keep pace with the standing of others, he must devote a sufficient portion of his time to observation, special study and instruction; not overlooking the changes in the improved implements of warfare, that he may be enabled the better to successfully attend upon their varying effects.

After returning to Arnfory quarters, all bed linen, towels and other articles of like convenience used about the hospital, which may be again used in like manner on an emergency call, and which can be thus cleansed, should be laundried, rendered aseptic and properly packed for use at a moment's notice. Mattresses, pillows and cots, having been cleansed as best conveniences would allow, should be likewise disposed of. The Panniers, or medicine chests, or both as the case may be, should be carefully invoiced, and all material that had been used should be resupplied, and all other which experience had shown to be desired, should be procured. All pouches used by the men, and the orderly's pouches, should be properly packed with potent material and left conveniently at hand for emergency or for school service. All repairs should be made on litters, and other hospital furniture which may have been damaged in any way to render such attention necessary.

In Ohio, to each regiment of three battalions, there is allotted four surgeons. One Senior Surgeon who ranks as Major, and

three "assistants," or Battalion Surgeons, with the rank of Captain. During each month in the year, except the month of the annual outing, to maintain an interest in the work, and to keep the men proficient in the service which they may be required to perform, there should be a lecture delivered by one of the Surgeons, designated by the Senior Surgeon, and a weekly quiz thereafter; all of which should be attended by all company bearers, as well as members of the corps, who reside within convenient distance to permit. The quiz to be conducted by another surgeon designated in like manner. These exercises could be made more instructive by having printed lists of questions, which should be extended in remarks by the surgeon conducting the quiz, to be distributed at the meeting preceding the one when the questions would be asked and their ambiguities explained; thus giving time for study and preparation. These should be mailed to all company bearers who reside beyond convenient distance to admit of their attendance at these meetings of the corps. In this way, by each officer devoting an hour of his time once a month, four weeks of each month would be provided for, and what other hours the corps might have for practice should be consumed in litter, ambulance and other drills, one of which, the study of the equipment, should not be passed unnoticed. Every member of the corps, and every officer of the medical department should familiarize himself with all the implements or appliances handled by them, or referred to in the performance of their duty. As an illustration, each member should be required to pack, unpack and repack his pouch at various times, acquainting himself with the name of every article which it contains, and its proper uses, and especially to study the manner of packing, so as to be able to have every article so placed as to be within ready access without its requiring precious time to secure it when called for by the Surgeon. And the Surgeon should be as accurately posted as to the contents of the pouches, that he may know the material at hand, and that he may not call for something which his orderly cannot furnish. The same rule should apply to every feature of stores which comprise the hospital supplies. Then, to keep the working force up to the proper standard both as to numbers and qualifications, I would have all vacancies in the corps filled by

competitive examinations from among the company bearers, thus establishing a feature of promotion worthy of competition.

Once or twice during the summer months an outing should be planned by and executed under the supervision of the Senior Surgeon. The hospital tent and sufficient equipment for special drill should be loaded and transported to a quiet and convenient locality. The practice of pitching, and arranging the furniture of the tent having been gone through with, regular field work should be taken up, using dummies for the occasion. This should include all features from the first dressing through to a major operation, where a complete preparation should be gone over, and a lecture delivered over the subject, explanatory of what the work would have been, had it been real. This, followed by the breaking of camp, and the packing and caring for the property, would furnish valuable information to all concerned.

Before going into camp, all surgical supplies should be rendered aseptic, and material which had become useless by the waste of time or other causes, should be discarded. This should be done for the threefold purpose of reducing to a minimum the bulk to be handled; to dispose of that on which perfect reliance could not be placed; and the supplying of fresh and potent material in its stead. Now, if the teaching has been well received, and the practice has been fruitful of good results, the Medical Staff and the hospital force will be prepared to go into the field and do some commendable work. During the hours of the afternoon in camp when the time is given to officers' schools, the same time should be devoted, by a medical officer, to teaching the hospital corps and company bearers. In this, the corps and bearers who have availed themselves of the preceding year's instruction will not only have an occasion to review the work, but those bearers from commands so far distant from corps quarters as to have deprived them of this advantage, can then receive like needed information. Then, too, the men who are selected to play the part of the wounded on the field, and who will receive their first attention from these bearers, they from the companies most remote should be designated most often, that the bearers from these commands might gain by practice, what their more favored comrades had been receiving through theory and demonstration.

There is ample opportunity afforded during company, battalion, and regimental drills, at each encampment, for instruction to the bearers and hospital corps in field work. These drills are usually conducted on a field more or less remote from the tented field, where the base hospital is located. Some place between that hospital and the parade grounds, even if it were necessary to establish a circuitous route in order to provide distance to accord with seeming reality, the ambulance station could be located. The first relief station would be close to the imaginary fighting line, which in this case would be the field on which the troops were being maneuvered. There are always enough men who report at sick call, and are designated for "light duty," who can be made available as dummies for field practice. Cards having been placed on the person of each by which the subsequent movements of the bearers, corps and surgeons would be directed. At opportune times these men could be carried off the field by the company bearers. At the first relief station the proper records should be made, the relief attended to, and the men transported on litters to the ambulance station, where the first dressings should be examined, corrections made, and possibly an emergency operation performed theoretically. The records audited, and all details provided for, the subjects should be loaded into the ambulance and conveyed to the base hospital. Here all preparations should have been made for caring for whatever work would have presented in an actual engagement, and an effort should be put forth to make it as real as imagination could devise. Let all minor details be observed as well as those of greater importance. All horses having been disposed of according to approved plans, after the corps had returned from the field, an operation should be described in all its details, and the dressings, records, and other work criticised by the surgeon in charge at that station. By alternating each day, both surgeons and men could occupy different stations, and thus be instructed in the work pertaining to each, and this work having been done in the forenoon, would furnish excellent material on which to conduct a quiz at the afternoon school. In following out such a plan, the objects of our assumptions will not have been overlooked; much practical information will have been obtained; and good, potent service will have

been made available should the exigencies of war suddenly demand its production.

In the selection of men who are to fill such responsible positions as Surgeons in the National Guard, too little attention is paid to their efficiency for this special field of work. In a medico-military sense, their appointments are too often made out of respect for sociability and congenial companionship, more than from good judgment and enthusiasm in the best interests of a command.

To point out the necessity for more creditable work and less show in this department, that it may, as a whole, bear a more worthy comparison with the same department in the regular army service, I have herein attempted to outline a practical course, the adoption of which, it was intended, should at least show an improvement over the present manner of conducting the work in many regiments of the National Guard of the different states, and would place such commands in a position to render adequate assistance, should occasion be presented.

Few surgeons among the state troops, before their commissions have been issued to them, have taken the precaution to inform themselves, in a military way, of the duties of the offices to which they have been chosen. To have been in position to be thus selected to fill these respective positions, preconcedes the fact that they are in some way representative men, or such as have attained a local professional reputation. Not a few have attained a wider scope of notoriety, and some are known far beyond the confines of their respective commonwealths. This latter class forms a part of those who are not strangers in their local, state and national medical associations, and we find them banded together here for the purpose of mutual benefit toward each other in this field of special work.

But we are only a few of those who compose their numerical strength. There is a large class whose faces are not seen among us, and whose names do not appear upon our roster. It is from this latter force that we may select those whose military enthusiasm seldom carries them beyond the annual camp, too often, as a convenient summer's outing at the expense of the State which they are presumed to serve. Such a course as I have above out-

lined, would find little favor among them, and yet it is toward the reclaiming of their respective fields that these sentiments are directed.

As a purifying measure, I can only repeat that it must first be recognized that the successful military surgeon must have been endowed with special taste for military work, and that greater care should be observed in the selecting of this class of men to fill these responsible vacancies. For, as before intimated, observation has proven that, to be a superior operator in the arts and sciences pertaining to medicine and surgery outside the field of military operation, does not guarantee that the same man would become as apt within the limits of its confines.

The sanitation of the camp which comprises the selection of a site where, after space for maneuvering the troops has been obtained by the commandant, must afford provision for proper drainage; an absence from miasmatic or other unwholesome surroundings; a sufficient and wholesome water supply, an adequate provision for disposing of garbage and sink accommodation; the inspection of the food supply and its proper preparation for healthful sustenance; the supervision of the policing of the camp, with a constant watchfulness over all things which are disposed to affect sanitation through susceptible environments, and many other duties aside from that which has been previously outlined, if properly performed, will furnish a vast field for study and operation and render the "summer outing" of the citizen-soldier-surgeon an exceedingly busy holiday.

METHODS OF INSTRUCTION IN FIRST AID.

BY CAPTAIN JAMES E. PILCHER, Assistant Surgeon, U. S. Army.

An ancient writer, named Agatharchides, in describing the prehistoric race of Troglodytes, dwelt upon their method of displaying fondness for the sick and infirm by affectionately drawing a cord about their necks until they suffered no more—the fact that the sick might object to such drastic measures, or that the patient's life was ended as well as his illness, appeared to cut no figure with the Troglodytes. They were not unlike the gentle Scythians, who were wont to employ a sort of Fabian policy in therapeutics, relieving their dear ones of the ills that beset them by tenderly depriving them of food until Death should arrive and complete their cure, which he invariably did in the most effectual manner.

Human altruism has, however, usually manifested itself in a different way. When, in the early history of our race, the sick received any attention, it was directed in the main toward the prolongation of life as well as toward the alleviation of illness. Efforts looking to the accomplishment of either were not a feature of early days. In case of war, no provisions were made by leaders for the relief of the injured in the field or on the march. The wounded soldier was dependent for help either upon the kind offices of his friends or the tender mercies of his enemies, and in the great majority of cases he was neglected by both, only to expire in lingering agony that was incomparably greater in its suffering than sudden death amid the fury of battle. Death being almost inevitable to the injured man, it is hardly surprising that the wounded warrior of old should have fought desperately until a fatal stroke put an end at once to present pain and future agony.

Wise in their day and generation were those communal soldiers of the Middle Ages, who took their wives with them into the field, in order that they might be assured of suitable nursing in case of a wound. Indeed, the vast companies of camp-followers that were found in the wake of every great army of that and later periods, were composed to no small extent of women, from whose numbers nurses were often secured for a favored invalid. But of organized and systematic assistance to the disabled there was none. The first field hospital in history was not established until the close of the fifteenth century, when Queen Isabella, of Columbian memory, established one at Antequera. And even this was but a sporadic case, which was hardly duplicated for a couple of centuries, until Larrey and Percy became the fathers of the military sanitary system which has attained so great a development at the present day. During that period, however, surgeons progressed from the position of personal attendants upon great commanders to a recognized official station, with duties toward soldiers as well as officers. Finally, the trained sanitary soldier was conceived and created. The instruction of a certain number of the soldiers of the line in the treatment of emergencies and the preparation of cases for the trained sanitary soldiers became a fixed fact, and now the magnificent conception of instructing the entire enlisted force in the elements of first aid has been evolved and put in operation.

The methods of rendering relief were even cruder than the plan or organization. The few surgeons who accompanied armies in the retinue of royalty and nobility were themselves in the majority of instances mere ignorant pretenders, able to give only the most unintelligent and blundering kind of assistance. When the presence of surgeons in military commands became more general and of better quality, their help was still inefficient and incompetent, and this condition persisted almost up to the present day. The brancardiers of Percy were litter bearers, not emergency men. The care of the wounded even in hospitals was of a most defective character as recently as in our War of the Rebellion, and the battle-field assistance was confined to the medical officers, aided by the "horse sense" of the wounded man's comrades. The thousands of deaths that occurred from a lack of an acquaintance

with the methods of applying temporary aid, and the thousands more than ensued from sheer neglect, owing to the lack of sufficient attendants and of proper organization among the few who were present, can never be sufficiently regretted. In more recent wars progress has been made; but, as a matter of fact, no military medical organization has yet been able unassisted to grapple with the huge masses of sick and wounded incidental to a great campaign. Solferino, with its five leagues of battleground thickly strewn with wounded in every stage of agony and lingering despair, incited the different nations to establish Red Cross societies. Yet, in the Franco-German War, when these societies put forth all their strength and struggled with unexampled energy, the wounded remained at Sulz on the battle-field absolutely deserted and additionally tortured by cold and hunger for three days; and at Gravelotte, where the ambulances could not arrive in time, the greatest suffering resulted among the wounded. At the beginning of the Russo-Turkish War the Russian official medical service compelled the admiration of connoisseurs, who asserted that nothing was left for others to do; yet, during the progress of the campaign, the efforts of the official medical service, the exertions of the Red Cross societies, and the benevolence of private individuals were all strained and taxed to the utmost in the endeavor to succor the prodigious masses of sick and wounded troops.*

The work of the sanitary corps of the Japanese army in the recent Chino-Japanese War was effective in the extreme. An observer remarked: "While the storm of lead was still hurtling thickly through the air, a company of Red Cross men, always well to the front, appeared on the field, stolidly marching out from the ravines, two and two, with stretchers and first-aid appliances for their comrades, right under the withering fire from the gunboats, with never a moment's hesitation. Unarmed but for a paltry dirk at the side, helpless in any case against attack, with foes heedless or ignorant of the sacred significance of the Red Cross badge, they did not flinch for a moment on their errand of mercy. It would have been easy to wait until the fire should cease, but they nobly went on and did their duty as if on the parade ground

*Roberts' "Ambulance Work."

at home. One by one, the dead and wounded were sought out all over that wide field of blood and borne away, until within twenty minutes the place was cleared of every man, living or dead." It was a most splendid example on a small scale of what first aid organization and instruction can accomplish.

When a nation so new in Western civilization as the Japanese can produce results which command the admiration of the world to such an extent as in this instance, who can deny the *raison d'etre* of instruction in first aid? The duty of rendering first aid to the injured after an engagement is characterized by Longmore as a "vast and serious concern, not merely important in respect to preventing aggravation of existing suffering, but upon it depends the question of life itself in numerous instances, and in many others the whole future condition of the wounded, whether it shall be one of continuous pain and of comparative uselessness, or the reverse of these conditions." With so much dependent upon a proper knowledge of the subject, the question of the best methods of popularizing such knowledge is of the gravest importance.

By common consent, the meaning of the expression "first aid" has been restricted to the temporary assistance to be rendered by persons without medical training in the interval between the accident or emergency and the arrival of a medical man. Emergency surgery and emergency medicine are subjects excellently taught in many medical colleges to embryo practitioners of medicine, but first aid is far from being taught in the same proportion to the general public. During the last score of years, however, much progress in this direction has been made, largely through the influence of the St. John Ambulance Association of England. Thousands of civilian practitioners throughout the United Kingdom, Australia, Canada, China, Germany, Gibraltar, the East and West Indies, Malta, New Zealand, Russia, South Africa and our own country, in addition to military surgeons, have undertaken the instruction of classes in first aid. The extensive amount of experience thus accumulated, supplementary to the military observations of many countries, is now available for examination and sifting in order to evolve the best method of teaching.

It was but natural that the oral method should have been the first to be adopted in teaching first aid. It was simply a recurrence to first principles. It was the way Adam taught Cain the gentle avocation of butchery and Abel the homely craft of horticulture. It was a most effectual method where the instructor was possessed of the art of putting things and the audience endowed with the faculty of rapid perception. But in these days we have not the phenomenal memories of other days, when all teaching was oral. Aids to the recollection are necessary not only on account of degeneracy of memory, but because the enormously increased extent of the field of knowledge has rendered it impossible for one mind to retain it all in detail. Nicolo Bertruccio, the greatest anatomical teacher of his epoch, taught the whole subject of anatomy in the eleventh century at Bologna in four lectures. But who would be so preposterous as to attempt to teach the subject as it is now known in a dozen times that number?

No description can take the place of a picture. The earliest form of writing was picture writing. The picture writing of the American Indian to-day is graphic and expressive in the extreme. Never was man such a master of word-painting that he could equal the sun for accuracy and suggestiveness. The pencil, the brush and the camera are of the greatest value in making clear instruction in first aid. The thirteen cartoons of Henri de Mondeville, upon which the entire instruction in anatomy at the Paris School of Medicine in the thirteenth century was based, are famous in medical history. The anatomical drawings of Bartolommeo Eustachio were so vivid and accurate, that when they were discovered a century and a half after his death and published for the first time, they rescued his name from oblivion and emblazoned it high on the tablets of immortality. The interest displayed by a class in anything like a picture is evidence enough of the value of this element of instruction in first aid.

Early in the history of such instruction, the value of practical demonstrations was recognized, but these varied greatly according to the taste and wit of the lecturer. It is difficult for many a man to place himself in the position of treating an actually injured man in the absence of an actual patient; it is sometimes

equally difficult to find a person who is willing to assume the role of an injured man, while it is rarer still that one can be found with the ability to assume the role in a realistic manner. There can be no question, however, as to the value of the practical demonstration; for, if conscientiously carried out, it will not only clarify the whole proceeding in the mind of the learner, but many points will be brought out unconsciously by the demonstrator. The training of the surgeon makes many things second nature to him which are absolutely beyond the ken of the non-medical man. These little essential features of treatment come to light in the practical demonstration. The demonstration also serves to correct in the mind of the learner misapprehensions into which he may have been led by ambiguities or technicalities in the words of a speaker. However careful a medical man may be in his effort to bring his language down to the comprehension of the uninitiated, some technicality, some scientific expression, precision itself to the physician but conveying no idea whatever to the layman, is more than liable to creep in and obscure the sense of his explanation. This the demonstration will entirely correct.

And then, as with the invention of printing the old medical teachers put their prelections into type in order that their students might have copies constantly at hand as aids to memory, so the earlier first aid instructors came to put their lectures into book form for the benefit of their classes. The "Erste Hülfe" and the "Samariterbriefe" of von Esmarch, the "Ambulance Work" of Roberts, the "Ambulance Lectures" of Martin, the "Emergency Notes" of Butler, and many others, were of this class, and are very attractive reading because of the colloquial style in which they were expressed. The little first-aid handbook of the late Surgeon-Major Shepherd, of the British army, was brought out by the St. John Ambulance Association, and a host of imitators sprang up all over the world. There was a demand, however, for more thorough, systematically arranged text-books upon the subject, which has been met by the publication of a number of more extensive books, which are now the recognized authorities upon the subject in this country. The crop of the smaller and more defective little manuals continues to be active,

every year producing one or two. There is no especial use for them; they are rarely in any way an improvement upon the original compend of Shepherd. Their only advantage seems to be that they excite an interest in first aid among the author's friends and adherents and certainly in the author himself, thus proving to be valuable agents in the propagandism of the subject. Whether this is counterbalanced by the fact that many of their readers are likely to look upon the compend as the sum total of the subject and to look no further, is a question. If, as is the case with the first-aid instructor in a metropolitan branch of the Red Cross Society, the teacher calls attention to the incomplete character of his own book and recommends the study of a more extensive one in addition, the only objection is wiped out. The proper use of the abbreviated manual is as a pocket book for constant carriage in the pocket as a remembrancer of the facts which have been learned by the study of a large one. The use of two books in this way is certainly an excellent practice, as will be seen in detail farther on.

The use of the text-book is best completed by the addition of recitations. A cultivated and experienced student may, perhaps, be able to absorb the contents of a book by simple perusal, but the ordinary reader cannot. Few persons have gotten beyond the stage of mental culture in which the verbal discussion of a subject which has been read is of the greatest service in fixing the facts in the mind. This is nothing more nor less than a recitation. Class recitation is preferable to solitary recitation, not only because of the advantages always to be derived from personal attrition with individuals engaged in the same pursuit, but because of the new ideas brought out in the class-room consideration of a subject. In numbers of instances in the writer's observation, suggestions of the utmost interest and advantage have been derived from the least promising members of his class during such discussions. The recitation plan is far superior to the lecture system because of the opportunity which it gives to the learner to formulate and fix the facts which he has been taught. For the same reason, it is even more to the advantage of the members of a first-aid class if they are given an opportunity to teach the subject to others. If a man possesses much personal

pride, the position will put him on his mettle to learn more than his class, and prove a genuine stimulant to study.

All of these methods of instruction have their advantages and all of them have their failings. A plan, to be thoroughly successful, should combine all their good features and exclude all their objectionable points. And yet it is impracticable to devise a plan that shall be equally adapted to every grade of intelligence. There must be at least two grades of instruction, and perhaps three. In the army we have four classes of persons to instruct: 1, officers of the line; 2, hospital corps; 3, company bearers; 4, all other enlisted men.

The instruction of the officers demands particular care because they are learning the subject not only for their own information, but for the purpose of in turn instructing the enlisted soldiers under their command. With the education and intelligence of this class, it will be practicable to proceed much more rapidly than with the others. It will usually be unnecessary with this class to pursue the recitation plan strictly, although the reading of a text book in connection with the instruction given by the medical officer is believed to be essential; nevertheless very great advantage will be derived from frequent discussions of the subject in a conversational way between the instructor and the class, and, when properly carried out, such *conversazioni* are ample substitutes for the recitations, considered essential for the second and third classes.

The facilities for the instruction of the hospital corps are greater than for either of the other classes, their residence in the hospital and their more or less constant contact with the sick and injured giving them a certain degree of technique to be gained in no other way, while their freedom from other duties makes it possible for them to give much more time to first-aid study than any other of the four classes.

The company bearer, according to the experience of some medical officers, has been a most unsatisfactory subject for instruction, for three reasons: (1) The fact that through carelessness in selection a poor class of men is apt to be detailed; (2) the frequent changes in detail; and (3) the interference of other duties with the hours of instruction. These faults are all usually easily

remedied—the first by calling the attention of the company commanders privately to the desirability of detailing good men; I have yet to find the company commander who is not amenable to reason under these circumstances. The second difficulty is also very readily overcome by calling the attention of the post and company commanders to the disadvantage of changes, and by declining to approve of new details. And as to the third objection, post commanders will almost invariably arrange for men on other duties to be present at the hour of first-aid instruction. I believe the company bearer to be an important factor in the first-aid work of the army, and it is hoped that he will remain as a permanent feature. The recent order requiring all enlisted men to be instructed in first aid has had a decidedly stimulating effect upon the company bearers. Realizing that they have the advantage of their comrades in their previous instruction, they are the more willing to push on and keep ahead.

The methods of instruction for the four classes may with advantage be very much the same, differing only in degree. The officers may be taught satisfactorily in weekly meetings and with the special modifications already suggested. The hospital corps, by daily instruction until qualification is attained, should be pushed forward to an entire acquaintance with the subject. The four hours a month allowed by Regulations for company bearer drill will, if economically occupied, be ample time for their instruction.

The method of instruction giving the best results is a combination of the *viva voce*, the text book, and the practical demonstration. The subject of each lesson should be gone over orally by the teacher before any recitation is held upon it. The talk upon the subject should be illustrative and demonstrative, and points should be clearly brought out. The lecture, if it may be dignified with that title, should exactly cover the ground of the lesson assigned in the text-book for the next session. To obtain the best results, it will not be sufficient for the teacher simply to read the account of the subject from the book, as is not infrequently done; he must speak in his own language and endeavor to infuse the magnetism of his own personality into his class. Many of the learners will prefer to read the text book version before the lect-

ure, thus placing themselves in a position to more fully appreciate the comments of the instructor. The next hour of instruction should then be opened with a recitation upon the lesson previously given out. This recitation should not be conducted in a pedagogical style, but with a view not only to ascertain the familiarity of the student with the lesson, but to fix it in the minds of the learners by every available accessory. Charts, drawings, photographs, specially constructed apparatus, and practical demonstrations should all be used whenever they can be applied. The stereopticon is a valuable assistant, but there is a temptation in its use to overdo the matter; it should not be used more than once in four or five hours of instruction.

The great tendency of the instructor in first aid is to fire over the heads of his audience. "There is a fatal facility in the use of technical terms," says Butler, which it is difficult to repress. To present his facts in simple language and to avoid technicalities is the earliest lesson the first-aid instructor has to learn. It is astonishing what ignorance of matters pertaining to the human body and the ills to which it is subject may be found in the most intelligent laymen. It was only the other day that I overheard a discussion upon the reliability of the Scriptures, the argument being finally closed by a man of the highest intelligence, an author and of commanding influence in the community, who triumphantly cried: "How is it, then, that a man has one rib less on one side than on the other?" No technical expression should ever be used until it has been fully and distinctly explained; and, in general, simple Anglo-Saxon nomenclature is better than the Latinized verbosity of the scientific treatise. "Bleeding" is better than "hemorrhage;" a bone had better be "broken" than "fractured"; "breathing" is as good as "respiration"; "bloodless" is clearer than "exsanguinated". Simplicity of diction cannot be sought for too assiduously.

It goes without saying that the elements of anatomy and physiology are an indispensable preliminary to first-aid work. The amount of instruction in this introduction to the subject will vary with the four classes to be instructed. The hospital corps, officers and company bearers should learn the skeleton to the extent of becoming acquainted with the names, shapes and locations

of all the principal bones and such conspicuous features of them as may be useful in first aid. It will not be necessary for them to learn the structure of the temporal or ethmoid bones, nor to know the tarsus or carpus in detail. But the peculiar arrangement of the bones at the elbow or shoulder or hip should be learned—they should know what the olecranon, the trochanters and the acromion are, because of their relation to many accidents; and a similar acquaintance with other parts of the osseous structure is essential for a satisfactory comprehension of the emergencies connected with them.

The study of muscles and joints in detail is not needed in a student of first aid. The emergency man will not attempt to reduce any but the simplest dislocations, and individual muscles will play but a very unimportant role in any assistance he may be called upon to render. He should, however, know the general characteristics, purposes and functions of them both. The nervous system is of comparatively little importance to the first-aid man, and he need study only the first principles of its structure and distribution. He must, however, know the topography of the trunk with reference to the principal viscera, because of the important bearing these facts have on the application of first-aid treatment.

The vascular system is, of course, by far the most important division of the body with respect to first-aid study, since treatment of its lesions forms the most important part of emergency work. The physiology of the circulation explains the philosophy of hemostasis, and the topography, particularly of the arteries, is an essential for the application of proper treatment for hemorrhage. The names of the principal arterial vessels should be learned and their location and some facts with regard to their size and relation to dangerous bleeding. I shall not attempt, however, to give a complete synopsis here of the anatomical and physiological facts essential as an introduction to first-aid study. I have done this in full elsewhere.* It is desired to suggest simply the merest outline preliminary to a brief consideration of the best method of teaching the facts.

* "First Aid in Illness and Injury," by James E. Pilcher, 8vo. Second edition, 1894, pp. 322. Charles Scribner's Sons, New York.

The bony framework itself is the foundation of all first-aid study, and nothing can be substituted for the human skeleton for this purpose. The best results are to be obtained from a combination of an articulated and a disarticulated skeleton. In the former the mutual relations of the component parts can be shown and demonstrated, while by means of the latter the peculiarities of the individual bones can be shown. The course of the circulation and the location of its component parts, other than the heart, can best be shown by charts, as, except in the rarest cases, it will be impracticable to demonstrate them upon the cadaver, which is the ideal method. Moreover, except with the hospital corps, who become accustomed to death through their ordinary duties, there are peremptory though sentimental objections to the use of any part of the cadaver, except the skeleton. But, while the topography must be obtained from charts, many of the most interesting general facts and much of the morphology can be displayed in the anatomy of the lower animals. The common domestic cat[†] is a treasure-house of information for the first-aid class. A dog may be even better, if he is larger. It is well to anesthetize the animal in the presence of the class and to demonstrate the action of the heart and lungs in active movement before life is extinct. If care has been taken that the act of digestion shall be active at the time of the demonstration, a display of the mesenteric lacteals is always received with great enthusiasm by a class. A few remarks upon the similarity and the differences in structure between the cat and the human being are always interesting and clarifying in their effect upon a class. The differences between the various kinds of hemorrhage can be shown by practical illustration, and by opening a vein and an artery at the same time the venous and the arterial bleeding can be actually compared. A muscle or two can be dissected out to show what muscle actually is, together with its general morphology, and the tendons and aponeuroses can be displayed. If the long muscles be taken for demonstration, an excellent showing of muscular action can be given. The biceps, for example, may be isolated

[†]The subject may be studied up with advantage in Gorham and Tower's "Laboratory Guide for the Dissection of the Cat," published by Scribner; or the excellent work on "The Dissection of the Dog," published by Howell, Holt & Co.

and the forearm moved by traction upon it, so as to show both flexion and supination. The sciatic nerve can be uncovered and used as an illustration of the elements of the nervous system. The skull can be opened and the undeveloped brain of the cat can be used to demonstrate the membranes and substance of the brain and its relation to the spinal cord. The brain itself can be made to give interest to the comparatively uninteresting topics of brain compression; for this purpose it is well to use two beef's brains, one hardened in alcohol to show the form of the brain and its parts; and the other fresh, to show the texture and friability of its substance—an important feature in the demonstration. A glance at ophthalmic anatomy upon a beef's eye may always be used with great advantage to lend interest to a lesson, while the study of the circulation can never be considered complete without a demonstration of the heart's action upon the cardiac organ of a bullock, using, to show the valvular action, either air through the blow-pipe or water through a rubber tube. The interested student of first aid should be advised always to read over in his manual on the subject the topic of the demonstration, both before and afterward, in order to prepare his mind to understand the demonstration and to impress upon his mind what he has been shown.

The elements of bandaging and surgical dressing should always be taught practically. For the ordinary first-aid class the triangular bandage will be ample, but the hospital corps must be taught the application of the roller bandage as well. It is my plan in teaching the triangular bandage, after carefully explaining the theory and practice of the dressing and showing its practical application upon all parts of the body, to divide the class into equal parts, calling them the front and rear ranks respectively. Each member of the class, then, at the word of command, applies each bandage upon the man with whom he is paired; first, each front-rank man applies the head bandage upon his rear-rank man, who then at the word of command reciprocates the act; the rear-rank man then applies the next bandage, and the front-rank man reciprocates—and so on alternately until the entire subject has been thoroughly gone over. This plan is an excellent one to follow in studying the treatment of bleeding, of broken bones and of wounds. It not only gives each member of the class actual

experience in applying treatment, but enables him to see its application in his own person, fully as instructive an experience as the other. What medical man has not learned far more about some malady by observation in his own case than he could have been taught by a thousand lectures and a hundred cases in other individuals?

The treatment of drowning and the use of artificial respiration for suffocation and other purposes may with great advantage be taught in the same practical manner.

Exercises in the extemporization of dressings are of the greatest importance and contribute greatly to the interest of a class. Each member should be given the opportunity to exercise his own inventive faculty in the origination of such appliances. The amount of ingenuity developed by these practical exercises is sometimes remarkable in the extreme. The suggestions as to materials for dressings, splints, padding, bandages and the like are often original and valuable enough to instruct the instructor.

Medical emergencies do not usually admit of practical demonstration. The "dummy chucker" does not, as a rule, practice his arts for the delectation of first-aid students, although it might be possible for an instructor whose work brought him in contact with the criminal elements in a large city to find one for the benefit of his class. I considered myself very fortunate when, upon one of my drill hours, a company bearer had an epileptic convulsion in the presence of the detachment. This has occurred but once in my experience, however, and I do not expect it again; and this class of emergencies, including the treatment of poisoning, particularly demands the use of a text-book. It is impossible for a lecturer, however graphic and impressive his delivery may be, to impress these subjects clearly, definitely and sufficiently by verbal effort alone. They must be learned by careful study and repeated re-reading.

One of the most efficient elements of success in maintaining interest is variety. A pursual of the method already rehearsed would give variety to a lesson upon most of the emergencies considered. But a plan that is of advantage in all cases is to divide the time for instruction into three parts, devoting one part to a brief lecture and demonstration, a second to a quiz and recita-

tion, and a third to litter drill. When either one of the three seems to demand more than a third of the time, any one or any two of them may be dispensed with. Variety may also be obtained by detailing a member of the class to conduct any part of the work, giving him sufficient time previously to enable him to prepare himself for the duty.

The foregoing remarks apply more particularly to the instruction of the first three classes—the officers, the hospital corps, and the company bearers—given by medical officers. The instruction of the fourth class—the enlisted men in general—must necessarily be much less complete, for several reasons, not the least of which is the lack of capacity upon the part of the men who are to receive it. The amount of instruction actually given to the companies will necessarily vary according to the personality of the instructing officer. But enough for the purpose may be presented in five lectures upon the following subjects, each occupying a full hour:

1. The Human Body (the skeleton and the circulation in particular).
2. Bandages and Dressings (the triangular bandage in particular).
3. Wounds and Bleeding.
4. Broken Bones.
5. Insensibility (drowning in particular).

These subjects need not be presented in a consecutive series, but the lecture hour for several occasions succeeding each lecture could with much advantage be devoted to going over the matter of the lecture with the men and fixing the points in their minds. Wounds, for instance, should not be ventured upon until the bandages and dressings have been mastered.

The question of impressing the facts retentively upon the remembrance of the men is a most difficult problem. Demonstrations of practical anatomy are, of course, out of the question, and it is usually impracticable for the skeleton to be used in teaching the bones. Here pictures must come in. Charts may be issued to the companies for general demonstration. It is impracticable to expect them to study first aid from a comprehensive text-book, for many of them have not the intelligence to comprehend the

subject upon reading, and a still greater number have not the patience to try it. In this case it seems to me that we should go back to the method of the untutored savage, which should be within the comprehension of the least intelligent soldier, and teach by picture writing. Something of this kind has been attempted in the German triangular bandage of Esmarch, which has been almost ruined in the peculiarly wretched American imitation. The St. Andrew's Ambulance Association of Scotland produces a triangular bandage which is a great improvement upon all others, and in it has been attained the climax of pictorially treated bandages. But these are unsatisfactory as means of instruction, both because of paucity of information and their deficiency in permanence. It is impossible upon a triangular bandage to illustrate, even with very small representations, a tithe of the points needed to impress the mind of the soldier, and the crumpling and soiling of the bandage in the hands of its possessor will easily render it too illegible for consultation—an objection which will grow with the enthusiasm of the frequently perusing soldier.

Admitting the value of the handkerchief within its limitations, *i.e.*, the illustration of only a few of the principal procedures in which it is applicable, we should go much further. The need can be supplied by a little book containing pictorial representations of all the important facts of first aid, with as little reading-matter as possible. After this idea had been quite fully developed in the writer's mind, his attention was called to the "Album für Krankenträger," of Dr. Ruhleman, a surgeon in the army of Saxony, which had been used with very great success in the German army. Dr. Ruhleman's book is directly in the line suggested, but with the pages a trifle too large and the illustrations very poorly executed. A little book upon this plan is now in active preparation for the American press, and in it an effort has been made to do away with the objectionable features of the German work, and to present a little manual clearly American in its characteristics as well as in its language, and arranged in the order suggested as the most desirable one for the instruction of the enlisted force.

Officers of the line may with much advantage, in transmitting

first-aid instruction to their commands, utilize as far as practicable the features for interesting and stimulating the attentions that have been presented by their own medical instructors, and add to them such other features as their own ingenuity and enthusiasm may suggest. Competition is always an important stimulus to work among men. The enthusiasm which is awakened by competitions of any kind, from baseball to rifle practice, may well give us points in our consideration of methods of instruction in first aid. The writer saw a Canadian judge and an officer of one of the Massachusetts courts, on the high seas and near the coast of France, where it was impossible for either to learn anything of the merits of the case, warm up to the point of personal collision over the respective merits of "Valkyrie III." and the "Defender." The quality which will, at the close of the nineteenth century, bring to the point of the duello two gentlemen of the practical Anglo-Saxon race, because of the rivalry of a couple of racing sloops, would certainly seem to be an advantageous addition to first-aid instruction. Competition may be introduced into first-aid military work by the institution of inter-company, inter-regimental, inter-department or brigade first-aid competitions, and the establishment of a grand periodical competition for the championship of the entire army. Each company being divided into little squads of four men, graded by a competitive examination, the winning squad should be entitled to compete for the championship of the post or regiment. The champions in this competition should then be assembled at some central point in the department, considering the army, or the brigade, considering the national guard, to compete for first place in the department or brigade. And, finally, at such intervals as may be desirable—annually, biennially, triennially, or even quadrennially—the department or brigade champions should be given an opportunity to compete at some central point for the championship of the army or State. A trophy, consisting, perhaps, of a bronze figure in armor protecting a wounded comrade with a shield bearing the red cross, might with advantage be the chief trophy, the custody of which would be awarded to the companies furnishing the victorious squad. Similar smaller designs could be awarded to the companies furnishing the department or brigade cham-

pion, and still smaller ones for the champion squads of the regiment or post. The writer has often observed the advantage of competition in drilling his own detachment. When the day is depressing and the men seem a little sluggish, the dummy wounded are often instructed to seek their own location, and then, after informing the detachment that the design is to see which squad will bring in its man the most expeditiously, carefully and safely, the command is given, "Search for wounded." At the first suggestion of an approaching competition an alert expression supplants the sluggish one, the eyes brighten, and eagerness characterizes every attitude. The response to command is instant, and their execution of the order characterized by a degree of efficiency obtainable in no other way. It is believed that the extension of the feature of competition to the entire army in the manner suggested will be of incalculable benefit in promoting the efficiency of the service.

First aid in illness and injury is an active, living issue of a concrete kind, that can be appreciated by every one, whether in the military service or in civil life. It is, then, of the highest importance to determine the methods of instruction from which the greatest efficiency of first-aid service can be derived. From our study, we have determined that in military practice there are two principal grades of instruction:

A. Instruction of the officers of the line, the hospital corps and the company bearers, given by medical officers.

B. Instruction of the enlisted soldiers in general, given by officers of the line.

1. The best method of instruction is a combination of the lecture, the demonstration and recitation from a text-book, neither of the three being sufficient without the accompaniment of the other two.

2. The best instruction is characterized by extreme simplicity of diction and the avoidance of all technicality in language.

3. The best instruction is progressive in character, beginning with anatomy and physiology and advancing to bandages and dressings, and then to emergencies proper.

4. The class-room work of the first grade is advantageously supplemented by home study of a first-aid text-book, and, when

desired, it may be complemented by the use of a pictorial remembrancer.

5. The class-room work of the second grade may best be confirmed and fixed by the use of a pictorial remembrancer, a copy of which should form a part of the equipment of every soldier.

6. Interest in the work of both grades should be stimulated in every possible way, especial attention being devoted to the development of interest in the second grade, a series of public competitions being suggested, the champions to be rewarded by the custody of suitable trophies.

By the methods and with the stimulus thus provided, it is believed that every member of the military forces of the country, including the army, the militia and the national guard, may become qualified to cope temporarily with any relievable injury that may occur on the march, in camp, or on the field of battle. War can never become benevolent, nor can bullets be transformed into white-winged messengers of peace; but the horrors of war can be enormously mitigated, the sufferings of unnumbered victims assuaged, thousands of useful lives saved. It has been stated that after an engagement more deaths occur from delay in applying proper treatment and from exposure on the field than from the fire of the enemy. It is the function of first-aid instruction to avert all these, and by the magnificent organization now established to diminish the mortality of future campaigns, to achieve victory at a smaller cost, and to dull the teeth of the dogs of war.

And in time of piping peace, no less than in days of raging war, will the good effects of the system be felt. The thousands of men that every year go out from the army and the national guard into the daily life of our country will carry with them the ability to succor the suffering and rescue the perishing, and, by the aid which they will afford here and there throughout the entire nation, will accomplish an amount of good, by the side of which even the splendid philanthropy of first aid upon the battle-field will seem to be insignificant in comparison.

METHOD OF CARING FOR WOUNDED IN FIELD AND HOSPITAL OF CHINESE AND JAPANESE ARMIES.

By Lieut.-Commander C. U. GRAVATT, Surgeon, United States Navy.

On March the 18th, 1895, the "Charleston," to which vessel I am attached, proceeded to Port Arthur, China. A division of the Japanese 2nd army was quartered in the town, with a headquarters hospital for about 100 men and another for 400 men; 300 patients were in the latter at the time of my visit, but among them only one wounded man. A naval hospital for about 200 men has also been established, but only 30 cases were present; no naval vessels were in port. On the 20th the "Charleston" went to Talien-wan, to permit more extended observation. Another division under Major General Fukuhara was found there. That officer, though very courteous, hesitated to grant permission to make the inspections sought, and referred me to Field Marshal Oyama at Kinchau, seven miles distant.

I went to Kinchau on the 21st, with a letter from the commanding officer stating the purpose of my visit.

Marshal Oyama expressed gratification at the interest displayed by our government in the matter and directed that every opportunity be afforded for my investigations, detailing an officer of his staff and an interpreter to accompany me to the hospitals, where every courtesy was shown. These contained few wounded, however, no action having recently occurred in which this army was engaged, and all serious cases were returned to Japan as promptly as possible.

From the above sources the following data have been collected. Enquiries have not been confined to the literal scope of the Department's order, but embraced most of the points that would naturally occur to a sanitary inspector of an army in the field.

GENERAL CONSIDERATIONS.

Recruits are enlisted at from twenty to twenty-three years of age, and are given a systematic course of physical instruction in barracks. So that a Japanese army is composed of young, vigorous and active men, whose power of endurance was well exhibited in the recent campaign, and without which such remarkable success could not have been achieved.

Tents.—None are carried except those intended for hospital purposes, captured towns and villages being relied on for quarters. In the event of enforced bivouacking each man provides shelter for himself of straw and brush.

Food.—This is principally of rice and rice cake, but dried fish [a staple article of Japanese food], canned beef and preserved beans, resembling succotash, are furnished. Fresh vegetables are frequently brought from Japan, and Chinese venders of most unpalatable looking dishes are plentiful in the towns.

Clothing.—Each soldier is supplied with an overcoat, two suits of underclothes, two pairs of shoes, a blanket, leggings and a large piece of very tough oiled paper, arranged to button around the neck. This, therefore, can be worn over all in case of rain, or be spread on the ground. The overcoat is made of stout brown blanketing, has a deep fur lined collar, and is a very warm and serviceable garment. The shoes are heavy and low cut, and the only inferior part of the outfit.

Many of the soldiers prefer to wear straw sandals on the march and when going in battle, I am told, owing to their lightness; and a number of cases of frostbite have resulted. Among the coolies, who number almost as many as the army and wear no shoes, this has been very common.

Summer clothing is now being made in Japan to replace the winter outfit, which will be sent back and kept for future use. The weight of accoutrements is about forty-five pounds per man.

Statistics regarding the effects of military service, showing the causes and percentage of mortality, the percentage of loss of strength by invaliding, the percentage of mortality to wounds and sickness, could not be obtained in the limited time at my disposal.

The medical men with whom I conversed agreed, however, that venereal diseases, intestinal catarrh, dysentery and bronchial catarrh are the most common affections, though none have reached epidemicity.

Pneumonia and pleurisy do not seem to have constituted a large proportion. Typhoid fever has been frequent, and is treated with hydrochloric acid with a mortality of about 10 per cent. Very few cases of diseases of the nervous system, the circulatory apparatus, the skin or eyes have occurred and no malarial troubles.

Sanitary Precautions.—As soon as practicable after the capture of a town, the officer who is to remain in command institutes measures for improving its sanitary condition—something sadly needed in every Chinese town and habitation.

At Kinchau a large force of Chinamen, employed by the Japanese, were engaged in cleaning the streets and houses, and I am informed that 20,000 yen were to be expended on the improvement of that city.

The streets there are sunk below the level of the houses and filled with mud, water and filth.

Closets have been constructed at many of the corners, and Chinamen are fined when detected in committing nuisances.

Water, which is properly regarded as the chief source of danger during the coming campaigns, is required to be tested, and orders are issued against the use of any pronounced bad, and it is proposed to restrict the army to boiled water if possible.

OPERATIONS IN THE FIELD.

A Japanese army, corresponding with our corps, consists of two divisions, composed of two brigades.

The brigade comprises two regiments of three battalions, and the battalion has four companies of 200 men each.

Six men of each company, though belonging to the fighting force, are detailed as "aids to wounded," and are indicated by a red band worn around the sleeve.

Every man carries in a pouch a triangular bandage and four strips of mercuric gauze, and is instructed in their application. The "aids" are furnished with tourniquets as well.

In action, the hospital department is disposed as shown in the diagram, the distances from the front being regulated by the nature of the ground.

A man being wounded is at once borne by the "aids to wounded," to the first dressing station, which is kept as close to the front as possible. The aids then return and resume their arms, or convey other wounded to the rear.

From the first station the wounded are carried on stretchers. These have a canvas bottom, with bamboo poles and a hinged dividing rod at either end of the canvas. When not in use the rods fold in and the stretcher is rolled up. It is light and serviceable.

Improvised stretchers are made with a split bamboo bottom. The men are handled and protected very carefully.

The hospital marked "C" has a double organization, so that if the brigade moves one-half of the hospital accompanies it.

The division hospitals are also movable. "E" is designed to receive cases so serious as to require transportation to Japan, and is taken charge of by the reserve hospital corps when the army advances.

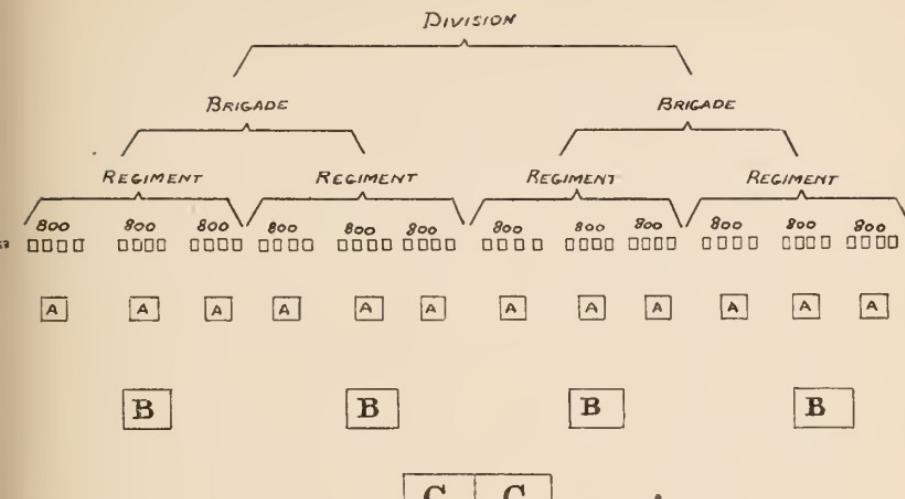
HOSPITALS.

These are all improvised establishments. Those at Port Arthur and Chinkow were formerly occupied by Chinese officials, while the one at Talienshan had been barracks and has dirt floors, though this is to be remedied. The ventilation of them all is deficient.

The space for each man is that of a futon or Japanese sleeping mat, three feet by six feet, laid on the floor, or in some cases raised two feet above. They are sent from Japan.

In the Naval Hospital at Port Arthur, wooden bedsteads such as are used in Japanese barracks, a rather clumsy affair, had been provided.

The bedding is always abundant and clean. Each patient on admission is given a hospital kimono [coat] made of white cotton and wadded, which is used but once and then returned to Japan for cleansing and fumigation, unless it can be done in the hospital. Ample bathing facilities are provided.



A	1st DRESSING STATION	{	2 ASSISTANT SURGEONS 1 CHIEF NURSE 4 NURSES
B	2nd DRESSING STATION	{	1 SURGEON 5 ASSISTANT SURGEONS 12 NURSES
C	BRIGADE HOSPITAL	{	8 MEDICAL OFFICERS 10 CHIEF NURSES 12 NURSES
D	DIVISION HOSPITAL	{	3 FOR EACH DIVISION
		{	6 Medical Officers 36 Nurses
E	FIELD HOSPITAL	{	1 SURGEON 6 ASSISTANT SURGEONS 40 NURSES
F	RESERVE HOSPITAL CORPS		

The patients are segregated according to their disease, and record kept of every case. In order to facilitate claims for pension, and at the same time as a safeguard against fraud, every wounded man is photographed and the site of the wound shown. In all serious cases of disease, too, the patient is photographed.

Chloroform is used almost altogether for anesthesia. Antisepsis is carefully observed, and a favorite dressing is made of carbonized straw. Bags of mercuric gauze of convenient sizes are filled with this and applied directly to wounds and allowed to remain for four or five days. The surgeons ascribe to it analgesic as well as antiseptic properties. Three or four medical officers are attached to the large and two to the smaller hospitals.

Each hospital has two apothecaries and usually one nurse to ten patients. The nurses in both army and navy are trained in hospitals at home for six months before engaging in active service, and I can testify to their merit from seeing dressings applied.

I regret very much having no opportunity to witness any surgical operation. Excellent discipline is maintained.

HOSPITAL SHIPS.

As soon as practicable after an engagement, all of the seriously wounded are sent to Japan. For this purpose two hospital ships, the "Kobe-Maru" and "Shin-Yo," have been fitted up. They were formerly passenger steamers belonging to the Nippon Yusen Kaisha.

The "Shin-Yo" was at Talien-wan. She has twenty-six state-rooms after with seventy-six bunks, for the accommodation of sick and wounded officers. Six rooms forward and the neighboring country, the ship's steerage, are reserved for infectious cases. The main cargo deck aft, ten feet between decks and cleared of every thing but stanchions, has been divided by a platform with passage ways, and designed for two hundred men, each having deck surface six by three, and cubic space of ninety feet. The air ports are small and all in the upper tier of berths. A few ventilators lead to the spar deck. Ventilation is therefore deficient, but fortunately the patients are kept on board only a short time.

The hospital force consists of a surgeon and assistant, two apothecaries and thirty nurses, all belonging to the army.

NAVAL SERVICE.

A matter of sufficient interest to deserve mention, regarding practical experience on men-of-war in action, was told me by the surgeon in charge of the naval hospital at Talién-wan. Although the usual mode of lowering wounded by tackle through the hatches has been employed by the Japanese in drill, it was found better in action to place them on the backs of their comrades and so carry them below.

The ward room was used as an operating room, and the exposed position of that apartment to the enemy's shot accounts for the loss of two medical officers in the battle of Yalu River.

It is concluded from such observation as I have been able to make that in organization, equipment, discipline and efficiency the hospital department of the Japanese armies is well worthy of admiration.

I have had no opportunity as yet to ascertain what methods are adopted by the Chinese.

WHEELED VEHICLES FOR THE TRANSPORTATION OF WOUNDED.

By MAJOR GEORGE W. ADAIR, Surgeon, United States Army.

The soldier is the most conservative of mortals. By long practice he learns to get the greatest possible use from the articles supplied, and he grows into such a belief in their perfection that the thought of improvement seems preposterous to him. To change his gun, his accoutrements, his uniform, or his drill is, for him, a grievance as well as an absurdity. This attachment to familiar things is an attribute common to humanity and, to some extent, affects all grades both in staff and line; and it is well to stop now and then and make a special search for defects; to examine the general principles underlying our work; to consider to what extent our present appliances coincide with those principles; to note the points of variance, and, by these means, to take new and more accurate bearings in our search for improvement. These considerations are the excuse for this paper.

The Civil War left us what was known as the Wheeling ambulance. When the writer entered the service, every post on the frontier had one or more of those vehicles. They were everywhere referred to as the "old yellow ambulance"—a very appropriate term—for they were always yellow and always old. For durability, they were unequaled; doubtless the running gear of some of them are still in active service. The writer has seen one of them turn somersaults down a side-hill, with no other disaster than some broken bows. The cushioned seats unfolded to cover the floor-space for recumbent patients. There was no provision for loading and unloading such patients upon a litter, and they were only fairly comfortable.

During the past twenty years much thought has been given to the subject, and boards of officers have been appointed to devise improvements upon this ancient vehicle; and, as a result, we have the present Red Cross ambulance. It is well to stop and ascertain what has been gained. Have the improvements kept pace with the requirements of modern war? If past efforts have not been sufficiently successful, along what lines must we seek better results?

One improvement has been attained: Provision is made for loading and unloading the helpless patient upon his litter. This provision for sparing the wounded man additional suffering and injury from frequent handling between the spot where he falls and the hospital where he will await recovery, is of great benefit to the patient, and, by economizing time, will be of great advantage to others awaiting transportation. This provision has, I believe, come to stay and must be retained in all future inventions.

It would be difficult to point out where, in any other respect, the new vehicle is better than the Wheeling ambulance. It carries the same load, and requires the same number of animals. It is of equal or greater weight, and develops structural weaknesses more speedily and constantly than its predecessor. In practice, its heavier and more complicated springs do not better secure from jolting and shocks.

If these boards had attempted to draw up a newspaper advertisement setting forth what they were seeking, they might readily have discovered that they were trying to solve an impossible problem. The advertisement would have read about like this: "Wanted.—A vehicle to comfortably and safely carry either two recumbent patients on litters, or eight sitting patients with the usual accoutrements of soldiers. It must be strong enough for service in rocky canons, and afford protection from a Texas sun or a Dakota blizzard. It must be well adapted for use on city pavements, or across unbroken prairies with a cavalry command, or through sand and mud, or over corduroy roads. It must be light enough to be drawn by two animals when the journey is short and the roads good; but must be strong enough to withstand any strain that may be given it by four strong animals."

It would at once be apparent that springs of sufficient strength

to undergo the severer tests, to support the greater load, can afford but little comfort to the two reclining patients. It would seem that the weight of this surplus iron, of so little use when most needed, must suggest the necessity for providing each litter with a special device against jolting.

To give the necessary resiliency to the legs of the litter would meet the indication; but to secure strength and durability under the rough usage to which the litters were exposed would add too much to their weight.

The French meet the indication by hanging the litters upon hooks attached to coiled springs. These are permanently fastened to uprights in the ambulance. These spring hooks are also attached to iron racks that go together like an iron bedstead—except that they have two side-rails on each side. These racks are made to receive three superimposed litters. They can be set up on ordinary freight cars, on army wagons, or on almost any vehicle that is found at hand. The third litter, however, is only used on railway cars, as the load would be somewhat topheavy on wagons.

In the Remington one-wheeled ammunition carrier and litter the spiral springs are in hollow steel tubes, and are adjustable for different loads. This idea may be capable of extension and may well be considered by our inventors.

A vehicle strong enough to endure the incidents of Indian warfare in the mountains can be used in the lighter service on city pavements, but the proportion of dead weight to load must be in extravagant excess. The market-gardener puts twelve or fifteen hundred pounds on his wagon, and one horse easily hauls it to market; for our smaller load of wounded men two horses hardly suffice, and four animals will certainly be required in a long campaign.

This excess in weight and in the number of animals required is more than a useless extravagance; it must seriously impair the efficiency of the service. In this rut our ambulance has stuck, oblivious to the world's progress. In old times, when troops marched to the place of rendezvous, when the mobilization of an army was an affair of weeks or of months, three of these vehicles could keep along with each regimental train, and—with some extra

ones with the reserves—a goodly number could be brought upon the battlefield. Now, mobilization is a matter of hours, the strategist aims to concentrate at the point of attack the largest possible fighting force; victory depends upon celerity and the available amount of railway transportation. Troops will be brought hundreds of miles. Will our four-horse ambulances be carried along? With a capacity for two reclining patients, can a sufficient number of these vehicles be gotten upon the field to meet the requirements of modern war?

I will not insist upon the increased destructiveness of modern weapons. I will admit the percentage of wounded may be no greater than before. Human nature is unchanged, and men will only stand the same amount of shooting now as then. The army that has lost one-fifth of its numbers will run away—if the enemy has not already done so. But the sum total of the wounded in the battle of the future must greatly exceed anything of which history tells. Summoned by telegraph, brought by rail, the armies will be vastly greater. Hour by hour trainloads of fresh troops will be poured into the strife. Will the due proportion of four-horse ambulances be brought along? Our sensitive, sympathetic, nineteenth century philanthropy answers: Certainly. They must be. But the affair will be ordered by a commanding general, who, in his way, is a philanthropist too—but one of broader view. His aim will be to reduce the number of wounded by overwhelming the enemy with an excess of fighting men; or by using every effort to check a victorious foe. When it becomes a question of leaving behind a Gatling gun, or ammunition, or soldiers of the line, to make room for an ambulance, can there be any doubt which will be left behind?

The wounded will be fortunate if the requisite number of medical officers get upon the field with a sanitary corps equal to two per cent. of the fighting force, with a fair supply of litters and simple dressings. That an approximation to the requisite number of ambulances will be at hand may well be doubted.

But what can be accomplished with our red-cross ambulances, if we have them? Let us simplify the problem. Let us go far away from the din and confusion of battle. Let us leave the roads, cut up by the wheels of heavy cannon and caissons, ob-

structed by trains and marching columns. To relieve the pressure at the field hospitals, the surgeons at the front have utilized the empty cars that brought troops or munitions of war, and notify us by wire that five hundred of the more seriously wounded are on the way to our general hospital, a hundred miles from the conflict. We must provide for these cases at once as other troops are waiting for the cars. Our hospital is only two miles from the railway station—while on the field the ambulance journey to a field hospital must be three or four miles. The train arrives. The waiting rooms and platforms are covered with wounded men on litters. Our red-cross ambulances are ready to receive them. How many will be required? Here there can be no hindrance to making an ample provision. How long will it take to give these sufferers the comforts of a hospital bed? The paved streets are intersected by car tracks and the loaded ambulances must proceed at a walk. It will take each ambulance an hour to make a round trip. Twenty-five ambulances can transfer these five hundred patients in ten hours. Fifty ambulances can do it in five hours—if there be no obstructions or delays; but, with the increased number, there is probable blocking and delay both at the station and at the hospital entrances. Will we not wince at the irony when kindhearted people volunteer to transfer these sufferers by hand?

To meet such emergencies, no hospital will keep fifty or a hundred animals in stall; for the animals can be hired for much less than the cost of maintenance. Would it not be cheaper and better to hire vehicles too? Not without much suffering and some danger can these patients be handled, and vehicles that can receive a loaded litter are not common. There are freight vans with broad¹ platforms extending over the wheels, upon which a half dozen or more litters can be placed crosswise—allowing the handles to project. Each of these will do the work of three ambulances.

Farmers bring loose hay to market upon racks that extend over the wheels to widen the load. With three hundred or more pounds of hay securely bound upon one of these racks, litters can be loaded crosswise and fastened to the binding pole. Any boy who has ridden upon a load of hay knows that a gentler and better

spring has not been invented. One such hay wagon will do the work of three ambulances, and do it better.

Will not some inventor take a hint from these suggestions, and from gas-piping or other material, make a light rack that can be securely clamped to the box of a coal-cart so as to clear the wheels, and capable of receiving four litters, each secure upon its own springs? With slight variation, such a contrivance could be made to fit upon an ordinary army wagon or any farm wagon that is at hand. Such a rack may be so light and compact that men can carry it to the field. It will be more likely to get there than a cumbrous ambulance; and it would make an army wagon the equivalent of three or four ambulances.

To these improvised conveyances the objection may be raised that the uncertain weather may be inclement, and no protection will be given to the wounded. This is another subject where our inventors may put us forward a step. The present ambulance protects the patient from sun and rain—while he is in it; but this protection must end speedily, for other men are awaiting transportation. Cannot this protection be made a part of the litter and continue over the patient as long as he keeps it?

If it be granted that frequent handling is bad for the wounded, the litter will continue to be the patient's bed until he is provided with a better. Can we not provide him with a canopy that shall shelter him from sun and rain? Cannot two light steel bows be sprung into slots in the litter-poles, to which the shelter-tent or poncho may be lashed as an awning? With such provision the wounded man would be quite independent of tentage or other shelter while awaiting his turn for operation at the field hospital—or for transportation afterward. With such provision the transportation of much heavy and bulky tentage could be dispensed with—allowing a larger supply of more useful articles; overcrowding in buildings of uncertain salubrity could be avoided. Resting on his litter, the patient would be always ready for a change of locality, and there would be fewer occasions for leaving wounded men behind. The field hospital would be less firmly anchored to a spot that becomes exposed to the enemy's fire, but could more speedily move to a more sheltered location. With each patient under his own shelter in an open field, the artist would no

longer find occasion to depict the horrors of a church or wareroom suddenly converted into a hospital ward, redolent with foul odors, and resounding with the mingled din of groans, prayers and curses of wounded men wallowing in straw while awaiting their turns to go to the overworked surgeons. Aseptic surgery would make a distinct advance in field-work, with a corresponding reduction in the percentage of mortality.

Folding cots are a delusion—broken when wanted—and by their weight and bulk depriving us of more useful articles. The litters are good enough for temporary beds, and if we give them canopy tops which shall dispense with heavy tentage, with folding cots, with bedside tables, with other useless trumpery, we may get enough of them upon the field to provide for the wounded in the battle of the future.

This is not a subject that admits of conclusions. This paper will have fulfilled its mission if it incites to a discussion of this question. Are our present appliances the result of a thoughtful experience, ripened through generations? or are they the survivals of a blind ancestral worship?

The writer disclaims any intention to dogmatism; his aim has been to leave the matter open for discussion. With this limitation the following ideas are formulated.

Firstly: Economy is a duty. In the end, useless expenditure will deprive us of things that are desirable. To provide and keep two animals, where one can do the work, is unwise.

At permanent stations, in times of peace, the only uses for an ambulance are to follow commands on practice marches, to convey an occasional sick man to hospital from his quarters, or from railway station or landing. It will also be used in the instruction of bearers. For these purposes a light ambulance drawn by one horse is amply sufficient.

In campaigns, the ambulance must have the same gauge as vehicles of other departments, and be provided with a double team to facilitate travel in the beaten path. Where more than one animal is used, provision should be made to receive at least four loaded litters. Whether these four litters shall be in one plane or superimposed remains an open question.

Where more animals are used than are required for the ordinary

load, cannot hospital equipments be stowed in a lower hold, leaving an upper deck for the reception of patients?

On the march will it not be well to transport the members of the hospital corps on the ambulances, letting them walk when their places are required by patients? This would seem better than to have these men mounted, considering the expense of providing so many animals, the difficulties of supplying forage, and the time that will be consumed in caring for them by a force that will always be small for the duties more specifically pertaining to a sanitary corps.

Special wagons may be provided for transporting the personnel of the sanitary corps and their baggage, in which case provision should be made for speedily converting them, as well as all supply-wagons, into vehicles for the conveyance of wounded upon litters, in case an emergency requires them to be so used.

Secondly: Useful experience can only be gained by experiment with many kinds of vehicles.

It is unwise to take as a model the uniformity of the regular army. Every kind of running gear from the buckboard and light surrey, through the various kinds of delivery wagons to the heavy herdic deserves attention. Due regard should be given to the topography of the region where the vehicle is to be used.

In certain climates and seasons, it may be found that the fixed top and curtains are unnecessary, and an adjustable awning that can be stowed away until needed may be better.

The essential is to receive the loaded litter upon suitable springs. All else is an open field for future inventors.

A PLEA FOR EARLIER AND MORE PERMANENT
TREATMENT OF THE WOUNDED ON AND
NEAR THE BATTLEFIELD.

By LIEUT. COLONEL WM. H. FORWOOD,
Deputy Surgeon General, United States Army.

The object of this paper is to call attention, very briefly, to some points in our field service where assistance to the disabled is often unnecessarily delayed and defective, and where the present system of medical aid appears to be in need of revision and amendment as a result of past experience and the introduction of new surgical methods. These points are:

1st. The usual absence of litters, for carrying wounded men back from the firing line to places of safety, during an engagement. 2nd. The lack of early and proper means for treating the wounded at the first dressing place. 3d. The frequent delay in organizing field hospitals. 4th. The too early removal of many severely injured from the field to the general hospitals. My observations on these points refer especially to field operations at some distance from the base of supplies, and to cases where there are a considerable number of wounded to be handled.

When an army takes the field it must necessarily be encumbered with a supply train of wagons for ammunition, rations, forage, baggage and medical supplies, and with ambulances for the sick and wounded. The train of wagons and ambulances is always a serious impediment and, in proportion to its size, a source of weakness and difficulty in the military operations of a campaign. It is liable to attack from the enemy, and it must be kept together and guarded and, in time of engagement, must often be

sent far back from the field to places of greater safety. The wagons belonging to different regiments, brigades, or divisions, cannot be interposed in rear of these commands on the line of march when a column moves forward to meet the enemy. The all-important matter then is success in battle, and the chances of this cannot be imperiled at that critical moment by considerations even of providing for the sick and wounded. The artillery and ammunition wagons have the right of way at such times, and the rest of the train must keep back until the battle is decided. Ambulances will not be brought under fire during an engagement. Those that are allowed to leave the general train can only approach the field under cover of some protecting elevation to a point more or less distant from the scene of conflict, where they must wait until victory or the peaceful shades of night offer opportunity to bring them forward. Now as both the stretchers and the medicine panniers are transported on these ambulances, they, too, will be absent during an engagement, and until after hostilities cease. The hospital corps men will hardly be expected to bring up stretchers over an open field swept by artillery and infantry rifles after the battle begins, and the heavy panniers could not be carried in any event.

Thus it is that medical officers with the troops and at the first dressing places on the field, are often left with neither panniers nor litters, and with no resources except their little field cases and the orderly pouches, with the sweat covered dressing packet carried by the soldiers, for any purpose of medical or surgical aid during and perhaps for some time after a battle. The wounded unable to walk must be borne to the rear on the backs of their comrades, or on such rudely constructed litters as may be improvised for the occasion, while in the absence of the medical panniers there is practically nothing available for the proper treatment of those who may be so collected together at places suitable for first dressings.

To meet, and in some measure overcome these particular difficulties, I would repeat the suggestion made by me on another occasion, that we adopt the use of pack mules for this service, independent of the ambulances. While it is quite impossible that the medical department should be allowed to obstruct the roads and

hamper the movement of troops with wheeled vehicles on the field, offering a target to draw the enemy's fire, a limited number of pack animals may be tolerated without much hindrance to the combatants. At least one pack mule to each brigade bearing a pair of medical and surgical panniers and two or three folding litters with light bamboo poles could be utilized and kept right up in rear of the commands to take position at the nearest place of safety when the fighting begins.

These pack mules should be led by mounted men of the hospital corps competent to prepare hot coffee, soup etc., from such limited supply of concentrated food as may find a place in the panniers.

It would be tedious to enumerate all needful things that might be carried and brought to the front in these panniers. Their contents would possess a double value because available just when most wanted and when other resources usually fail. A roll of wire splint material and a spool of adhesive plaster for the quick and comfortable immobilization of broken bones; a few plaster rollers separately wrapped and sealed; a small nest or two of tin vessels for cooking and for sterilizing instruments and dressings; a yard of rubber tubing with suitable needle attached for the transfusion of salt solution after loss of blood; stimulated for shock, a hypodermic syringe with tablets; a few instruments, plenty of dressings and a lantern should be included in the list. A tent fly can also be carried, for shelter, and the panniers themselves are so constructed as to form a convenient operating table. Two or three stretchers will be two or three times more than are usually on hand during an engagement, and that number in each brigade may suffice.

A few emergency operations will be required at first dressing places, such as the elevation of depressed fracture of the skull, the rapid ablation of a mangled limb, or a more formal amputation. This carries with it the necessity for some safe and simple means of aseptic work, which may comprise green soap, hot water, bichloride tablets, sal soda and sterile catgut or tendon ligature. With boiling water and sal soda the surgeon sterilizes everything except his hands, the parts to be operated on and the catgut. With the green soap, hot water and bichloride, he pre-

pares his hands and the field of operation. Catgut and animal tendon for the field must be furnished ready for use. The gauze, and when necessary the contents of the dressing packets, may be boiled and wrung out before application to wounds.

These are some of the essentials demanded by the necessities of the wounded at the first dressing stations on the field under present surgical methods. They cannot be supplied under our present arrangement for field service, and yet these demands are not so numerous nor so difficult but that, with due preparation beforehand and with the advantages of modern concentrated food stuffs, compressed tablets and dressings and compact instruments, they may easily be met and fulfilled through this simple addition to our resources at the front, of the pack mule and medical panniers.

LOCATION OF THE FIELD HOSPITALS.

With the first dressing places thus properly equipped, the wounded may safely await the arrival of advance ambulances with stretcher bearers, and the establishment of ambulance stations. But now the important question arises as to the location of the field hospitals. When this point has been timely settled, the wounded may be promptly gathered in to places designated, where they can have the advantage of urgently needed rest after their injuries and receive early treatment under favorable conditions. Experience shows, however, that the establishment of field hospitals is often a matter of uncertainty and long, vexatious delay. Mounted officers of the hospital staff come upon the field in ample time, but under our present system all the material for their work is transported on heavy wagons in the general supply train, and can only be got to the front when opportunity and proper authority will permit. They are usually parked at some safe place far removed from the battle ground. During the battle of Gettysburg this was at Westminster, twenty-five miles away. They will rarely be available until the next day, and perhaps not for two or three days after an engagement. This most serious difficulty would be avoided by the organization of an *advanced detachment* of each division hospital, to be transported in two or three light, quick-moving ambulances, which should take

precedence over other portions of the supply train. Through the efforts of the medical staff already on the ground this detachment might be brought up and put in operation early in the day at some suitable place, where the wounded could be sent as soon as possible after the receipt of their injuries to prevent exhaustion and wound infection by unnecessary delay. With two or three hospital tents and as many folding tables for operations, a supply of instruments, dressings and other appliances, including some form of light cooking apparatus and concentrated food, much could be accomplished, and much valuable time, otherwise wasted in fruitless waiting, could be saved, and the wounded collected together while the heavily loaded wagons were coming up. The value of medical aid under such circumstances will often depend on the promptness with which it is received. Suffering, disability and mortality from wounds are increased by every hour that intervenes between the time of injury and the receipt of proper attention. The scheme here suggested for shortening this interval is simple, practical and easily carried into effect, and may be made the means of saving much pain and many valuable lives.

PERMANENCY OF THE FIELD HOSPITALS.

During the war of the rebellion it was the policy of the government to establish general hospitals in the larger cities, and to transport the wounded as soon after battle as practicable from the field to these hospitals for permanent treatment. The total capacity of all the general hospitals was 118,000 beds. More than half of these were located in the northeastern part of the country from Washington to Augusta, Me. In the D. C. there were 21,000; Baltimore and Annapolis, 6,000; Philadelphia and vicinity, 19,000; New York and Boston, 15,000. From Cincinnati to Detroit there were 11,400; from Louisville to Knoxville, 8,500, and at Nashville and Chattanooga, 10,000. The rest were scattered in various cities, including 6,000 at New Orleans, 3,500 at Fortress Monroe, 3,000 at St. Louis and 3,000 at Cumberland and Frederick, Md.

By comparing the location of these hospitals with that of the fields where most of our great battles were fought, it will be seen that in nearly every case the wounded had to be transported over

long distances before reaching their destination. These journeys were made in ambulances over rough roads, and on freight cars and boats. There were many delays on the route and many changes from ambulances to cars and from cars to boats, and again to ambulances. Most of the 9,260 wounded at Chickamauga were transferred in ambulances and wagons over almost impassable roads, from the battle field by a circuitous route of nearly sixty miles to Stephenson, Ala., and then by rail one hundred miles further to Nashville, Tenn. Wounded from the campaigns in Pennsylvania, Maryland and Virginia were brought as soon as possible to general collecting depots, such as those at Camp Letterman, Frederick, Belle Plaine and City Point, and then forwarded to Washington and places further north. Thus it was that after every battle many of the severely wounded, including cases of compound fractures of the leg, thigh and knee joint, and wounds of the chest and wounds after capital operations, spent the first week or ten days and sometimes longer, immediately following their injuries, in being hauled and jolted about from one point to another before reaching any permanent place of rest and treatment. On arriving at the hospital it was usually recorded that their wounds were swollen, painful and suppurating, or even gangrenous, and that the patients were weak, nervous and much exhausted. By reference to the surgical history of the war many remarkable instances of this kind will be found, showing the disastrous effects of continued motion and excitement for several days after gunshot wounds; injuries such as might be expected to result in but slight disability, suppurating and leading to loss of life or limb; operation wounds refusing to heal and followed by sloughing, gangrene and general infection were of frequent occurrence.

The lesson taught by this experience seems plainly to indicate that for the first few days or weeks after their injuries the wounded should be kept at rest and treated at some point as near as possible to the battle field, and that we should make strenuous efforts to send provisions and surgeons and nurses to them, rather than to risk the lives of many by their immediate removal to the general hospitals. Where from unhealthy surroundings, climatic conditions or dangers of the enemy, this course becomes impos-

sible, then they must accept the sacrifice as one of the exigencies of war, and the slaughter that necessarily results from their being hauled about must be added to that which takes place on the field. If the journey to the wounded be long and beset with obstacles, so much the more reason why their friends should make it rather than they. The "bring in dead or alive" policy should not be pursued through considerations of mere convenience or expense. It is no more difficult to carry tents and folding cots and blankets to the wounded, than it is to transport the wounded from the field, and with these appliances they can in many cases be made comfortable, for a time, on or near the battle ground, where, under the advantages of rest and prompt treatment, their injuries will do much better than in the crowded wards of a general hospital.

SYNOPSIS OF A "REPORT ON THE MEDICO-MILITARY ARRANGEMENTS OF THE JAPANESE ARMY IN THE FIELD, 1894 AND 1895."

Made to the Director-General, British Army Medical Department, by Surgeon-Colonel W. Taylor, Army Medical Staff.

By COLONEL DALLAS BACHE, Assistant Surgeon General, U. S. Army.

The comprehensive report, of which the essential features are here presented, was made, as the title shows, by a medical officer of the British service, accredited for the purpose of observing the medical organization and operations of the Japanese army in the field, during the war with China, 1894 and 1895.

The Memorandum of Instructions which defined the scope and directed the details of these observations, is as follows:

- "1. Nature and character of the principal general hospitals at base of operations.
2. The field hospitals stationed at the base or on the line of communications.
3. The field hospitals proper, including the dressing stations and regimental stations.
4. Hospital ships and transports.
5. Sanitary arrangements.
6. Food, its nature and mode of cooking.
7. Water supply, and means of purification thereof.
8. Medical organization of corps.
9. Dress and equipment on field service.
10. Transport of sick on land by stretchers, ambulances etc.
11. Surgical and medical equipment on field service.
12. Antiseptic treatment of gunshot wounds, what form and how applied. Results of it under various conditions, such as accumulation of wounded in a limited area.
13. Management of gunshot wounds of femur.
14. Form of splint for the treatment of different kinds of fractures.

15. Presence or absence of septicemia or tetanus in hospitals, its causes and treatment.
16. Occurrence of dysentery, diarrhea, fevers, cholera, plague, or parasitic disease among troops.
17. Use of hypodermic injections of morphia in gunshot wounds.
18. Effects of modern weapons on bones and soft tissues.
19. The Red Cross Society or similar institutions in Japan; its duties and usefulness."

The report itself, full and intelligent, follows strictly the sequence of subjects indicated, and might be produced entire with profit; but for the immediate purpose of this paper some compression is desirable, and it is thought that, under this restriction, clearness will be gained by a different order of development. With the reduction to a smaller compass actual fidelity to the text cannot always be observed, although frequently indicated, and it may be that there are some errors of interpretation. In avoiding the latter, a paper upon the same topic read by Colonel Taylor before the Aldershot Military Society, has been used with advantage. Such comments as have been suggested by the matter of the report are reserved until the close of this paper.

MEDICAL SERVICE OF REGIMENTS AND BATTALIONS

Infantry regiment:

- 2 Surgeon-Captains (1 may be Surgeon-Lieutenant-Colonel).
- 4 Surgeon-Lieutenants.
- 3 Chief Attendants.
- 12 Ordinary Attendants.
- 48 Reserve (i. e. regimental) bearers.
- 6 Panniers (3 horses) and 12 stretchers (1 horse).

Cavalry battalions:

- 1 Surgeon-Major or Surgeon-Captain.
- 1 Surgeon-Lieutenant.
- 1 Chief Attendant.
- 1 Ordinary Attendant.

No panniers or stretchers, only the medical and surgical bag carried by each chief attendant.

Battalion of Artillery:

1 Surgeon-Major or Surgeon-Captain.

2 Surgeon-Lieutenants.

1 Chief Attendant.

6 Ordinary Attendants.

EQUIPMENT—2 panniers carried on a wagon in the field, and on a pack-horse in mountain artillery.

Battalion of Engineers:

1 Surgeon-Major or Surgeon-Captain.

1 Surgeon-Lieutenant.

1 Chief Attendant.

2 Ordinary Attendants.

No panniers or stretchers, only the medical and surgical bag carried by each chief attendant.

Battalion of Transport:

1 Surgeon-Major or Surgeon-Captain.

2 Surgeon-Lieutenants.

3 Chief Attendants.

The Japanese regiment of infantry consists of three battalions of four companies each, the companies numbering two hundred men; the regimental strength being therefore 2,400. The forty-eight reserve or regimental bearers, four to each company, are trained men belonging to the regiment, distinguished by a red band worn above the elbow of the left arm. They are not neutralized by the Geneva Convention.

The scope of the regimental medical service in action comprises: 1st, Medical aid in the fighting line, and 2nd, Service in the temporary dressing stations. One-half of the personnel remains upon the line engaged, following closely its movements, and the other assists at the temporary, regimental, dressing stations, to which it has proceeded with the pack animals carrying the medical and surgical equipment. These stations are closed or advanced when the bearer companies begin their organized work; the regimental bearers, who have deposited their arms and knapsacks either at the dressing stations or with the regimental reserve, returning to their companies unless otherwise directed. The chief and subordinate attendants are employed with the

front under fire, and primarily at the dressing stations, but the Japanese regulations seem to insist upon the regimental medical service keeping well closed up in touch with the battle front, relying upon the advance, or corresponding movement, of the bearer columns and field hospitals in their turn.

MEDICAL EQUIPMENT, PERSONAL AND REGIMENTAL.

All medical officers carry a pocket case, which for those of the rank of captain and above is provided by the officer himself. This is carried by the dismounted officer in his officer's bag, by the mounted, in his saddle bag.

Each chief attendant carries a medical and surgical case, containing:

In the lid—scissors, probe, forceps, pencils.

In a tin case, covered with a lid which forms a dressing tray—Dover's powder, aromatic powder, pil. quiniae, pil. rhei, 1 tin of adhesive plaster, 1 bottle of Hoffman's liquid, 1 bottle pil. morphia 1-6 gr., 1 bottle hypodermic injection morphia, 1 bottle ol. olivae camphorat., 1 tourniquet., 1 tin medicine measure.

In bottom—3 first field dressings, 1 paper safety pins.

Each attendant or under officer attendant should carry a bandage bag, containing 1 bottle Hoffman's liquid, 1 bottle iodoform, 1 tourniquet, 3 first field dressings, 3 triangular bandages, 3 gauze pads, 1 sponge, 1 case of isinglass plaster, 1 medicine cup, 1 pair of scissors, 8 roller bandages, 1 paper of safety pins, 1 tray.

In this connection it is well to mention here that every officer and soldier carries, in a pocket in the left hand corner of the skirt of his tunic, one first field dressing, which consists of antiseptic gauze, oiled paper, triangular bandage and one safety pin.

The regimental medical and surgical chests—panniers—are six in number, made, as all the panniers are made, of cane or basket work covered with leather and divided into compartments. They are light, strong and stand the wear of service well.

"A" Pannier for Infantry.

On top under the lid—3 red cross direction flags, a quantity of corrosive sublimate cotton wool.

In upper left compartment—12 oz. corros. sub. wool, 10 oz. corros. sub. gauze.

In lower left compartment—6 tally books, 20 field returns for submission every 10 days, and other field returns, 20 oz. corros. sub. gauze.

In upper center drawer—blank paper, envelopes, pencils, 1 tin isinglass plaster.

In middle center drawer—pestle and mortar, scales and weights, 3 medicine horns, spatula, spoon, brush, papers for medicines, carbolic soap.

In lower center drawer—10 bottles, viz., 1 carbolic acid, pure, 1 brandy (1 pound), 1 chloroform, 1 olive oil, 1 tinct. iodi, 1 capsule of corros. sub., 1 nitrate of silver, 1 olive oil camphorated, 1 liq. ferri perchlorid., 1 Hoffman's liquid.

In upper right drawer—20 triangular bandages, 24 roller bandages.

In lower right drawer—24 roller bandages and 4 1-2 yards calico.

"B" Pannier for Infantry.

On top—1 red cross flag.

In left hand well—red and white lamps (1 of each), oil tin, spare wicks, matches.

In middle well—12 bottles, containing bismuth, pot. salicylas, pil. rhei, acid tartaric, quinine, alum, zinci sulph., iodoform, P. ipecac, P. digitalis, P. opii, hypodermic injection of morphia (1 p. c.).

In left corner—sodae bicarb., ungu. simpl., P. Doveri, 8 field tourniquets, glass tube for eye drops, hypodermic syringe, a case of morphine powders (1-6 gr. each).

In right hand upper corner—knife and saw in one, 3 paper lacquered irrigators, fitting into the other.

In middle right compartment—3 paper lacquered dressing trays, 7 sponges.

In small center compartment—6 tins of plaster.

In bottom compartment (whole length of pannier)—1 box with chloroform inhaler, 1 box with gag, 20 small splints, hand and finger, 27 English thin wooden splints, lined, 30 thin wooden arm

splints, 1 bundle of hemp fiber for making gypsum splints, 1 canvas bucket.

A description of the gypsum splint will be given later.

BEARER COMPANIES.

The bearer companies, of which there are two to each division, together with a central administration, or center, form a divisional organization.

PERSONNEL OF CENTER.

- 1 Captain, called captain of the medical staff corps (mounted).
- 2 1st or 2nd class under officers (1 clerk, 1 superintendent cook).
- 1 Surgeon-Major as chief medical officer (mounted).
- 1 Surgeon-Captain (mounted).
- 6 Surgeon-Lieutenants (mounted); in guards 4.
- 1 2nd or 3rd class pharmacist, officer.
- 3 Pharmacists; in guards 2.
- 10 Chief attendants; in guards 8.
- 26 Attendants, under officers; in guards 20.
- 1 Commissariat officer, 2nd or 3rd class.
- 1 Clerk, 1st class, under officer.
- 1 Transport under officer (mounted).
- 3 Transport soldiers (1 at least a shoeing smith, mounted.)
- 36 Transport carriers with 36 pack horses; in guards 33.
- 2 Servants.
- 9 Grooms; in guards 7.

Total 104—viz., 11 officers, 43 under officers, 50 men, 49 horses,

PERSONNEL OF BEARER COMPANY.

- 1 Captain of company (may be a lieutenant) (mounted).
- 1 Under officer.
- 2 Sub-division commanders, 1st class under officers.
- 6 Section commanders, 2nd class under officers.
- 145 Bearers (1 trumpeter, 1 tailor, 1 shoemaker); in guards 109.
- 1 Horse boy—soldier.

Total—156—viz., 1 officer, 9 under officers, 146 men, 1 horse; in guards 120.

Each company forms two subdivisions of three sections each.

Total for center and bearer companies, 416 officers and men, and 51 horses.

This column is under the control of the division commander, who is advised by the chief of the division medical staff, this lat-

ter assuming control when delay will ensue in communicating with the division commander.

Each bearer column bears the name of the division to which it belongs, and as to personnel and material is so organized that it can at any time be divided into two equal parts. In organizing, matters relating to medical personnel, medical and surgical equipment, are dealt with by the chief of the medical staff of the division, but the rest is in charge of the transport battalion commander.

The order of march of the column is fixed by the division commander, but ordinarily one-half marches with the advance guard, in front of the second line of the first artillery company, and the other half in the main body, in front of the second line of the artillery regiment.

The function of the bearer column is to act between the fighting line and the field hospitals, serving the intermediate dressing stations primarily established by the regimental medical personnel; which thus relieved returns to the fighting front.

The dressing stations, of which the number is not indicated in the report, are established under the usual conditions as to protection from fire, accessibility by road, vicinity to water, and are distinguished during the day by a white flag with a red cross, and by the national flag; while at night they are marked by red lanterns. The usual guidons are also placed.

The work of the dressing station is divided into three parts or sections, indicated by flags or banners of different colors.

(a) Receiving and forwarding section, blue. Personnel: one medical officer, one chief attendant, one or two attendants.

(b) Operating section, white. Personnel: one surgeon-major, chief of the center usually, two or three medical officers as assistants, and some chief attendants.

(c) Dressing section, red. Personnel: one medical officer, and some chief attendants, or attendants, as assistants.

The functions of these sections are sufficiently indicated by their names. In each the most minute care is given to the records. The identification of patients is secured, if they are not able to give the information, by examination of the identity tag or metal label worn by all, the officer's name being engraved, the

soldier's regiment and number given; from the pocket-book, cap, or clothing. The registry of all property is also provided for.

The medical and surgical equipment of the bearer column consists of 4 panniers, 8 reserve panniers, 96 stretchers and 2 tents. For this there is an allowance of 36 horses apportioned as follows:

Medical and surgical equipment (field panniers, 2; reserve panniers, 4; stretchers, 8; tents, 2)	- - - - -	16
Reserve clothing	- - - - -	1
Provisions	- - - - -	7
Cooking utensils	- - - - -	6
Remaining equipment	- - - - -	4
Spare	- - - - -	2
		Total horses—36

The reserve clothing consists of blankets for the sick of the under officers and soldiers of the bearer company. As the aid given to patients is only temporary, no clothing or blankets are carried for them, such as may be with them or in their knapsacks being used. An emergency supply may be obtained from the nearest field hospital. The repair of instruments is also done by the mechanic of the nearest field hospital.

It does not appear from the report whether or not the panniers of the bearer company are identical with those of the field hospital, and as the aid given by the former is temporary, and there is much in the table of contents quoted that is irrelevant to a dressing station, there is a presumption of difference. The reserve panniers are larger than the field, and contain larger quantities of the most commonly used and expendable material and medicines.

No. 1 (Medical) Pannier.

Medicines.—Sodae carb., glycerine of carbolic acid (equal parts), sodae salicylas, ol. olivae, ol. ricini, liq. ferri perchlorid., Hoffman's liquid, chloroform, quiniae sulph., tinct. iodi, P. Doveri, P. sodae et gentian, P. ipecac, acid tartaric, argent. nit., aetheris camphorat., P. jalapae, tinct. opii, chloral, opium, iodoform, collodion, calomel, P. calumbae, hypodermic injection of morphia (1 p. c.), zinc sulph., cocaine, bismuth, morphine.

Materials.—Corrosive sublimate gauze, antiseptic cotton wool, 700 tabloids of corrosive sublimate (in tubes, each tabloid=1

gramme), paper for medicines, isinglass and other plasters, ointments, scales and weights, pestle and mortar, measure glasses, labels for medicines (white for internal, and red for external use), spatulas, medicine cups, 4 brass enameled washing basins, saw, hammer, matches, canvas bucket, tin labels for wards, dispensary etc., 3 copper boilers, kettle, handle for ditto, abacus, wall lamps with reflectors, red cross lamp, lantern, candles, ink box, Japanese pens, pencils, office knife, spare wicks for lamps, oil can, nails.

A case of gum elastic catheters.

No. 2 (Surgical) Pannier.

Eighteen labels (tin)—11 for wards, 1 for operating room, 1 for dispensary, 1 for collecting station, 1 for office, 3 ward directors, red cross flag, oiled paper, calico, bandages, Gooch's splints, sets of thin wooden, tin splints, 3 Liston's splints and pads, hemp for gypsum splints, 1 syringe, lint, india-rubber pillows, pillow covers, capital case of instruments, pasteboard for splints, drawer containing scissors and forceps, another with dressing and artery forceps, irrigators, tubing, clips, ligature material.

Two good oil lamps.

Case for the chemical analysis of water, the contents of which were as follows:

Test papers (litmus and turmeric), box of test tubes, brush for cleaning ditto, burette stands to screw into lid of box, box of pipettes, glass tubes graduated, filtering papers, measure glass, spirit lamp, alcohol, distilled water, permanganate of potash, oxalic acid, nitrate of silver, perchromate of potash, liq. brocine, liq. ammoniae, solution of oxalic acid, nitrate of potash, chloride of barium, sulphuric acid, iodine and starch solution, Nessler's solution, Myer's solution.

The contents of these panniers are supposed to last one week. They were found during the war to be quite sufficient for one month.

The capital case of instruments is very much like our own (British). The instruments were formerly all obtained from England, France, or Germany, but now they are made by local

makers in Tokio, and made as well as they could be by any European manufacturers.

The bearers themselves, leaving their knapsacks at the dressing station before commencing work, take with them only their swords, or revolvers, if these are authorized, water bottles, and to each stretcher squad of three bearers, a bandage bag. This bag contains:

1 bottle Hoffman's liquid,	1 bottle iodoform,
1 tourniquet,	3 first field dressings,
3 triangular bandages,	3 gauze pads,
1 sponge,	1 case of isinglass plaster,
1 medicine cup,	1 pair of scissors,
8 roller bandages,	1 paper of safety pins.
1 tray,	

There is no description of the field stretcher in this report, but it seems to have been made of bamboo with canvas bottom, and movable crosspieces. The regulation stretcher for land transport was much heavier, 28 to 32 pounds, made of wooden poles and stretcher pieces, the bottom being of canvas. The supports or legs for these are not mentioned. Most of the land transport of patients was done with these stretchers, and the native springless bullock cart.

FIELD HOSPITALS.

There are six field hospitals to each division, bearing the division name, and numbered from one to six. Three are with the first line of transport and three with the second. Their function is to receive wounded from the dressing stations, or directly from the fighting line, to continue or complete the treatment previously received, and to be prepared for rapid evacuation should the relief of the bearer column be necessary.

The medical personnel and material, the clothing of the patients and the utensils, are selected by the chief of the medical staff, all other material and equipment, including animals, is provided by the commanding officer of the transport battalion. The latter also regulates the march and encampment of the field hospitals.

FIELD HOSPITAL PERSONNEL.

NOS.	DESIGNATION.	OFFICERS.	UNDER OFFICERS.	MEN.	HORSES.
1	Chief, Surgeon-Major.....	1			1
1	Surgeon-Captain.....	1			1
4	Surgeon-Lieutenants, 1st or 2nd....	4			
1	Pharmacist, 2nd or 3rd class.....	1			
1	Commissariat officer of the intend- ance, 1st or 2nd class.....	1			
6	Chief Attendants.....		6		
3	Pharmacists.....		3		
6	Attendants.....		6		
34	Orderlies.....			34	
1	Mechanic.....			1	
2	Clerks, 1st, 2nd or 3rd class.....		2		
6	Soldiers, as clerks and cooks.....			6	
1	Transport under officer.....		1		1
3	Transport soldiers (one at least a shoeing-smith).....			3	3
38	Carriers.....			38	38
6	Servants.....			6	
2	Horse boys.....			2	
116	Total.....	8	18	90	44

This would furnish to each division, 48 officers, 108 under officers, 510 men and 264 horses.

FIELD HOSPITAL EQUIPMENT.

Field panniers, 4.....	2 horses.
Reserve " 8.....	4 "
Tents, 4.....	4 "
Clothing.....	13 "
Diet materials.....	5 "
Cooking utensils.....	4 "
Camp utensils, treasure chest, officers' baggage, reserve clothing.....	3 "
Spare.....	3 "
Total horses.....	38

The quota of patients for each of the hospitals appears to be 200. Specific directions are given as to the choice of situations for

these hospitals, shelter from fire, readiness of access, cleanliness of ground, avoidance of unsanitary villages. If, however, suitable houses or villages are available, they will be occupied, and a certain division of accommodation made.

- (1.) Administrative offices, (including financial), in the centre.
- (2.) Receiving and dispatching office.
- (3.) Wards for patients.
- (4.) Operating theatre.
- (5.) Dispensary, including store for medical and surgical equipment, and for the mechanic.
- (6.) Kitchens.
- (7.) Bathrooms (sometimes dispensed with).
- (8.) Mortuary, in detached and separate buildings.
- (9.) Latrines, in detached and separate buildings.
- (10.) Recreation room.

The directions as to routine administration, operations and records are carefully drawn.. The position of the field hospital is indicated by the same means as previously described for the dressing stations.

TRANSPORT.

Passing from the field hospitals to the rear, along the lines of communication to the base, patients are in the hands of the hospital transport staff. There is an organization of this kind for each division, as to which the chiefs of the division medical and intendance staff, and the battalion transport commanders, are charged with certain duties. This divisional unit is controlled by the division commander, and operates only so far as the etape jurisdiction on the line of communication. It consists of:

1 Chief, Major or Captain,	2 Medical officers,
1 Chief attendant,	2 Ordinary attendants,
1 Clerk,	3 Orderlies,
3 Servants.	
Total—3 officers, 4 under officers, 6 men.	

The etape medical staff governs the medical service on the line of communication and consists of :

- 1 Surgeon-Lieutenant-Colonel or Surgeon-Major as Chief of Etape Medical Staff.
- 1 Surgeon-Captain or Surgeon-Lieutenant.
- 1 Pharmaceutist (when there is no reserve medical store.)
- 1 Under officer.

There is also to each division a reserve medical staff, and a reserve medical store, the personnel of each being specifically designated, the number of animals allotted, its jurisdiction and mixed responsibility defined.

To return for a moment to the sequence of medical control. The medical staff for the division consists of :

- 1 Surgeon-Colonel, or Lieutenant-Colonel, as Chief.
- 1 Medical officer.
- 1 Pharmaceutist officer.
- 2 Chief attendants (under officers.)

For an army :

- 1 Surgeon-General or Surgeon-Colonel as Chief.
- 1 Medical officer.
- 2 Chief attendants (under officers.)

Finally the supreme medical control is vested in a Field Medical Commander, who is the chief of the Medical Department of the War Office, and during war serves with the Grand Headquarters of the army. He has for his personal staff :

- 1 Surgeon-Lieutenant-Colonel or Surgeon-Major.
- 1 Pharmaceutist officer.
- 2 Clerks.

HOSPITAL SHIPS AND TRANSPORTS.

There were no hospital ships proper for the army, and but two military hospital transports. These had nearly the same medical establishment :

- 1 Surgeon-Captain (army) in charge.
- 2 Temporary Surgeons (civil), hired.
- 2 Pharmaceutists, (1 temporary.)
- 1 Chief, and
- 15 Ordinary attendants.
- 5 Under officers.
- 20 Servants.

The transports were supposed to accommodate 500 and 700 disabled officers and men respectively. A hospital ship, which accompanied the fleet, was much better arranged and provided. "She had accommodation for 50 officers and 200 men. The officers' accommodation was in the first class cabins, which were

roomy, well lighted and warmed with steam pipes, and were well ventilated. Each cabin had two good sized iron beds, or cots, with wire woven mattresses. About half were on the upper deck, and were particularly light and airy. They were reserved for the serious cases. They were lighted, as was every other part of the ship, with electric light. An operating room had been made by throwing two of these cabins, on the port side, into one, and putting in large glass windows. A special electric light was fitted over the operating table, and there was also a movable hand light. There was a plentiful supply of water in the room, which was also fitted with all the latest modern appliances for the special purpose for which it was intended. The second-class cabins were kept for warrant and petty officers. They were of similar construction, though not so highly finished as the first class cabins. Each cabin had four iron cots with wire woven mattresses. They were well lighted and warmed by steam.

"The men were accommodated in the freight hold, and on the main deck forward. There was space for 50 men on the main deck forward, 80 on the lower deck, and 70 aft, under the first class saloon. They lay on platforms—not in bunks—raised about 18 inches from the deck. The space allowed for each man was 7 feet by 4 1-2 feet. Each had a quilted mattress of cotton, a Japanese pillow, a pair of white sheets, and two blankets marked with a red cross. The clothing for each consisted of a good flannel shirt and the usual wide-sleeved, quilted, hospital gown, with a red cross on each sleeve. The patients were scrupulously clean and comfortable.

"There was a senior naval medical officer in charge, with six other officers under him, and a staff of pharmaceutists and attendants. There was a well-equipped dispensary and a liberal supply of surgical appliances and materials. The officer in charge had only to ask for what he wanted in the way of equipment; there was no scale of supply."

GENERAL HOSPITALS AT THE BASE.

The reserve hospitals are established either within military garrisons or outside, and civil hospitals or other suitable buildings are utilized. They bear the name of the locality where they are

situated, as: "Shimoniseki Military Reserve Hospital," or "Hiroshima Military Reserve Hospital." They have the following personnel:

1 Chief; Surgeon-Colonel, Surgeon-Lieutenant-Colonel,
or Surgeon-Major.

2 to 3 Medical officers.

1 " 4 Pharmacists, officers.

1 Commissariat officer.

3 to 5 Chief attendants.

1 " 6 Pharmacists, under officers.

2 " 8 Commissariat, under officers or men.

30 " 40 Attendants.

1 or 2 Mechanics.

42 to 70 officers and men (5 to 9 officers, 37 to 61 under officers
and men.)

For every increase of 40 patients over 120, 1 medical officer, 1 chief attendant and 10 to 13 attendants may be added.

Deficiencies among the medical and pharmaceutical officers may be supplied by temporary civil practitioners and pharmaceutical officers; among the attendants and pharmacists, by first or second class attendants, or by hired employees. The duties of all, except of the hospital chief, commissariat and under officers, may be taken by members of benevolent societies.

The responsibility is to the commander of the territorial division.

The expansion of the garrison hospital of 200 beds, at Hiroshima, into a general hospital may be taken as an example of rapid and effective work.

"In June, 1894, war was declared. On the 5th of that month the 5th Division was mobilized. On the 8th July it was ordered that the garrison hospital should become the reserve military hospital, and it was decided to build three temporary divisions, and to occupy the old parliamentary buildings as a 4th Division, besides erecting additional temporary wards in the garrison hospital enclosure. Convenient and suitable sites having been selected building was commenced, and by the 30th of the month the three new divisions were completed, and new buildings, capable of accommodating 2,555 patients, with offices, kitchens, operating theatres (in two of the new divisions), stores, and all the

usual accessory buildings were begun and finished in less than a month.

"The surprising rapidity with which these temporary buildings were constructed is not more surprising than the smallness of the sum it cost to build them. The average cost of each building, consisting of two wards for twenty patients in each, a large central room used as a day and examination room by medical officers, and as a day room for the nurses and attendants, with bath rooms, latrines and urinals, was, for ordinary wards, 780.66 yen. Those for serious cases, where the building was partitioned off into a large number of small wards for one or two patients each, cost 950 yen. Taking the yen at 2s. the cost in pounds sterling would be, for buildings for ordinary wards £78, and for special cases £95."

"Attached to the base hospital was a school for the training of attendants and orderlies. It was under a medical officer, and men belonging to regiments ordered to the front, as well as to the reserves of regiments already there, were constantly being instructed in the duties of stretcher bearers, and to give first aid. The course of instruction, owing to the stress of circumstances, was a short one, only lasting about a fortnight, but the men had to work every minute of those two weeks, and that they were turned out perfectly trained was demonstrated at the regular parades of the bearer companies, at which they were tested in every way. The great feature of the training given by the Japanese in such matters is, everything that a man is likely to have to do in the field he is made to do and shown how to do, over and over again, until he masters it, in the instruction room. There is no difficulty put in the way of either the instructor or the pupil becoming thoroughly acquainted with every article of equipment which the latter may be called upon to use. All such articles are supplied in abundance, and the men are encouraged to use them daily. They are made to pack and unpack them, to learn their names and uses, and taught how to use them where necessary. They are also instructed in the making of all sorts of temporary stretchers, and encouraged to devise new patterns. The result is, as might be expected, most satisfactory."

AUXILIARY ASSOCIATIONS.

Ample provision is made for the work of benevolent societies, but entire subordination to the regular military and medical authority is exacted. "The aid given by benevolent societies, such as the Red Cross Society, is confined to the base and line of communications. It may, in emergency, but only then, and so long as that exists, be extended to the second line, but never to the first."

The Red Cross Society was formally inaugurated in Japan in 1886, by adhesion to the Geneva Convention, terminating the existence of its predecessor, the "Society of Benevolence," established in 1871. The Society is under royal patronage, thoroughly organized, and numbered in 1894, 75,902 members; employing in this war 1,170 medical officers, female nurses, orderlies and officers of administration. Of this total 471 were female nurses serving in the general hospitals at the base.

SPECIAL TOPICS.

Topics 12 to 18 inclusive, of the Report, may be profitably considered together, as they concern the antiseptic treatment of wounds, management of special fractures, occurrence of camp diseases, and several points of associated inquiry.

The first field dressing consists of two folded pieces of corrosive sublimate gauze, a piece of waterproof paper, and a triangular bandage. That is the only protection until the dressing station is reached. There a supply of almost every kind of antiseptic dressing—carbolic acid, corrosive sublimate, iodoform, boric acid, oakum etc., was available. A solution of corrosive sublimate, 1-1000, was generally used for washing and irrigating wounds, which were often also dusted with boric acid or iodoform.

"They were dressed with a pad of corrosive sublimate wool, or with Dr. Kikuchi's straw ash pad. The latter was very extensively used, as being much more economical than the former, and could be made anywhere. It consisted of the ashes of burned straw freed from all grit, and put into bags of antiseptic gauze, which were kept ready made in all sizes. It was applied directly to the wound and a bandage put over it. If there was little or

no discharge from the wound, the pad was applied dry, but if discharging freely the pad was first soaked with corrosive sublimate solution.

" The pad was very absorptive and could be left on the wound for three or four days without being changed. I saw a case of amputation of the thigh (an officer), at Port Arthur, dressed with the ash pads. They were applied directly to the wound, having been first soaked with corrosive sublimate solution; a piece of waterproof paper was put over them, and the whole kept in position by bandages. The pads were soft, agreeable and soothing; they caused no discomfort, and wounds dressed with them always did well. The case of amputation of the thigh did extremely well, the flaps uniting rapidly.

" When these pads were not used, which was very rarely, especially in the 1st Division field hospitals, the dressing consisted of corrosive sublimate wool, a piece of protective, some common wool and a bandage. Drainage tubes were always used where necessary, and when the dressings were changed the wounds were always thoroughly well irrigated. Loose pieces of bone in a gunshot wound were never removed forcibly, but were left to come away in the discharge or irrigation.

" Although there was very often considerable overcrowding in some of the buildings used for hospital purposes, the rooms being small, the results of the above form of treatment were uniformly good.

" The flesh wounds were treated on the same principle as those of all other gunshot wounds. Every attempt was made to save the limb, however severe the injury to the bone. Amputation was never resorted to until every effort to save the limb was found to be hopeless. The wounds were always carefully trimmed; all lacerated tissues, or such as were likely to die, were removed, as were also all foreign bodies. The wounds were thoroughly cleaned, and well irrigated and dressed, and the limb put on a splint, or in splints. No pieces of loose bone were ever removed; on the contrary, if there was much smashing, the pieces were put back into their normal positions as much as possible.

" Various kinds of splints were used, but that most commonly applied, almost universally, was the gypsum splint, made with

bundles of hemp fibre soaked in, or smeared with a soft paste of the salt. The other splints in use for fractured femur were Forkmann's, with counter extension from the pelvis upwards to the top of the bed, and Liston's."

The gypsum splint, mentioned before, was preferred to all others in the various forms of fractures, and as less liable to displacement during transportation of the patient.

As the Chinese preferred the oldest firearms, and even bows and arrows, and the divisions of the Japanese army armed with the new magazine small caliber rifle (Mourata) were not engaged, there was no opportunity of observing the effects of modern weapons on bones or soft tissues. Morphia, as to which inquiry was made in the instructions, was not used by hypodermic injection in the case of gunshot wounds.

There was no septicemia, and the few cases of tetanus observed followed frostbite, during privation and exposure.

The prevailing camp diseases were dysentery, diarrhea, typhoid fever, cholera and more rarely, malaria.

Cholera was carried to the army at the front by the troop transports, and although vigorously attacked, and in spite of intelligent quarantine, it returned, although in much diminished intensity, with the troops to Japan. The death rate at Port Arthur was about 33 per cent., the most successful treatment having been the subcutaneous injection of normal salt solution.

Typhoid fever was attributed to the unsanitary condition of the Chinese villages occupied. Muriatic acid was used largely in the treatment, and the death rate is reported at about 10 per cent. of those attacked.

There was but little malaria. Beri-beri was frequent.

FOOD, COOKING, WATER.

"The daily ration in peace consists of 6 go of rice ($5\frac{1}{2}$ go=1 litre) about 36 ounces in bulk, and 6 cents (or sen) for the purchase of beef, chicken, pork, or fish and vegetables, tea, pepper, mustard and miso, a kind of pea flour.

That amount of money does not purchase much of all these articles, but of course they are not all used together, and the Japanese are satisfied with a very small proportion of animal

food if they can have their rice flavored with fish, or some kind of seasoning, such as the soy they use so much.

" The rice is boiled in bulk, in large boilers for each platoon or section of a company. The meat, chicken, fish or vegetables are cooked separately, put into small dishes for each man, and served to him with his rice. The quantity of meat, vegetables etc., is not constant, as it depends upon prices.

" The daily field ration consists of:

Rice.....	36	oz. (bulk).
Chicken, beef, pork, or fish.....	5	
or		
Preserved meat.....	2½	
or		
Dried meat.....	3¾	
Vegetables, fresh.....	5	
or		
Dried Vegetables.....	1⅞	
Spice, made from daikon or other vegetable	1⅞	
or		
Preserved plums.....	1½	
or		
Salt.....	3/8	
Soy, miso, tea.....	Sufficient.	

" In hot weather hard flour biscuit is substituted for rice, as the latter, boiled, is liable to decompose. The quantity of biscuit is not given.

" The foregoing was virtually the ration which the men got during the campaign. Very often they were able to add to it, as in many places pigs were plentiful, and were considered fair plunder. All other supplies, obtained from the people of the country, were paid for, but the pig was looked upon as legitimate loot. Sweet potatoes, maize, onions, cabbages and turnips were found in many neighborhoods, and were added by the soldiers to their daily ration.

" The cooking is very simple. If the men were with their regiments and the cooking utensils were up with the column, the rice was boiled in the large company, or section boilers, and the preserved meat, vegetables or spice, which each man carried for himself, getting his stock renewed every two or three days, were

added by the men themselves. If the meat issued was fresh, it was cooked (boiled or roasted), cut into portions and distributed with the boiled rice. Rice is a very portable kind of ration, and the preserved articles were carried in either tins for the meats, or neat little wooden boxes for the dried vegetables, spice and preserved plums. There was no outbreak of disease attributable to faulty or unwholesome rations, unless beri-beri can be said to be caused by rice, or due to its use as the staple article of diet, in which case the whole population of Japan is as liable to that disease as the soldier in the field.

"On a campaign like that in which the Japanese army was engaged there was not much choice of water, and the troops were obliged to use what they could get. Each battalion carries with it a box containing appliances and materials for the chemical analysis of water, and it is the duty of one of the medical officers to go on ahead to any proposed halting place, for the purpose of examining and reporting upon the water in the different wells of the place. That could not always be done in war time, but, when a village or town had been entered, no water was supposed to be drunk, or used for cooking, until the medical officer had reported upon it.

"Each battalion is directed to carry two wooden filters, bucket-shaped, with a layer of fine sand at the bottom, then one of coarse sand, and on top one of gravel, each layer being separated by a piece of sponge cloth (? asbestos cloth). These filters were not always used. The water, it was ordered, should be boiled before being used for drinking, but that order was not always, or even commonly, carried out. It seemed to be nobody's duty to see it obeyed; besides, there was very often the greatest scarcity of fuel, so that the water could not be boiled.

"Each officer is supposed to possess a small pocket filter made of brass, filled with charcoal, with a piece of sponge over each opening between it and the charcoal. Two india rubber tubes were attached, one on each side, to small projecting openings in the breast; one of these tubes was put into the water and the other in the mouth. These filters were not much used."

DRESS AND EQUIPMENT.

The weight of the infantry clothing and equipment, including rifle, ammunition and special ration, appears from the table in the report to be 56 pounds 13 ounces, but it is not certain whether all of the articles enumerated are carried or simply allowed and provided. The weight given is, however, apparently correct.

"Besides the ordinary greatcoat during the cold weather, the men and officers of the army, mobilized for the war, had one which was made of brown blanketing with a hood, and special covering for the head at night concealed under the collar, and a pair of mittens of the same material as the coat. It was a most serviceable and comfortable coat of good shape and good color for field service; it came down to the ankles, or nearly, and had a band which buckled around the waist. It was presented to the army, one for each officer and man in the field, by the nation; the cost of the supply having been paid for by public subscription.

"The men in the field had also a paper shirt and pair of drawers. In very cold weather these were worn, the former between the usual under and ordinary shirts, and the latter over the ordinary drawers. They were said to be very warm. The mittens were made with only two divisions for the fingers, leaving the forefinger in one, so as to permit of its pulling the trigger of the rifle."

Much inconvenience and suffering was attributed to the ill fitting shoes, the want of warmth and poor character of the canvas gaiters, and the insufficient protection afforded by the cotton socks.

"The knapsack was faulty, causing distressing pressure on the chest and in the axilla. The Japanese soldiers were not given to complaining, and so the knapsack was carried, weighted as it was with forty rounds of ammunition in a drawer in the upper part of it, without a murmur. It was a very common thing, however, to see the men trying to get relief from the pressure and distress by hitching up the knapsack with a jerk, or during a halt, stooping well forward, with their heads almost between their knees, to let it slip towards the top of the shoulders, and thus relieve the dragging and constriction. The knapsack, which measured (out-

side) $11\frac{3}{4}$ inches by $10\frac{3}{4}$ inches by $4\frac{1}{2}$ inches, contained 40 rounds of ammunition in a drawer at the top, two days' reserve rations (rice for three meals each day, and two tins of preserved meat), spare parts of rifle, and underclothing, in the body; in the flap, housewife, some dried fish and a spare haversack; and on the top a waterproof in which was some underclothing (a change), great-coat and a tent d'abri of waterproof calico 3 feet $3\frac{1}{2}$ inches by 4 feet 7 inches, with diagonal strings projecting at the corners, and three cords equally dividing three sides, and at one side a puckering cord in its center. On each side of the knapsack was a shoe with a pair of socks inside it, and, strapped on the back, a canteen of sheet iron. The iron dish for boiling rice was also carried on the back of the knapsack, generally hung on to the iron canteen. Had the campaign been in hot weather the men must have suffered severely from thirst, as there were so many bottles lost. These were made of sheet-iron, japanned outside and galvanized in. Each man carried a brown canvas haversack 11 inches across from side to side, 10 inches deep, and 3 inches from back to front at the bottom. This was meant for anything the man liked to carry of his own. One man had in his an oilskin bag 21 inches by 7 inches, rolled up lengthwise, with a string at the top end; there was also in it some strong thread for sewing on buttons and some emery paper.

"The material of which the tunic and trousers were made was blue cloth with stripes of different color to distinguish the different arms of the service, and the number of the regiment on the shoulder strap. The troops have white clothing for summer wear. The cap is round, about $3\frac{1}{2}$ inches high, flat crowned and with a yellow band 2 inches wide round it. It has a small flat leather peak, which gives no protection to the eyes.

"In the case of the men of the bearer companies and the orderlies belonging to field hospitals, lint and bandages, with some antiseptic wool, are carried in the drawer of the knapsack in which the fighting man carries 40 rounds of ammunition."

COMMENTS.

While it is not possible in any summary to reproduce the full value and impression of Colonel Taylor's excellent report, I think

that any attentive military reader will be struck by the careful adherence of the Japanese to detail, within a comprehensive scheme of medical organization, and by the profusion of medical personnel and equipment.

To illustrate this latter point, for the former needs no other emphasis than the text, if you foot up the allowance of under officers and men for a division of infantry, excluding the regimental bearers, but beginning with the purely regimental attendants, through the two bearer companies with their center of administration, to and including the six field hospitals allowed, you will find the total to be 1,111; the division numbering apparently 9,600 men, or two brigades of two regiments each. It is true that many "carriers" or packers are attached both to the center of the bearer column and to the field hospitals, men performing the work of teamsters and packers in our own service, and that there are servants, grooms and horseboys, but deducting all these, the under officers and men directly concerned in the medical organization number 788. This for the service of the front alone, and not counting the personnel of the reserve medical store, or any other assistance. Again as to the field hospitals, while it is true that many of the number authorized may not be utilized or even actually equipped, as at Port Arthur only three of the nine allowed were in actual operation, yet the fact remains that the medical provision for a division of infantry contemplates the service of 1,200 beds, or an accommodation for 12 per cent. of the command.

Beyond the expression of approval of a careful provision, and admiration for certain related field experiences, the Report does not contain any observation upon such details of administration as the dual control of the bearer companies, and other points upon which the practice in various armies differs. It does say, however, that the mixed control in the transport resulted in confusion and delay, and so worked to the detriment of the patient. The presumption is fair that had the casualties of the campaign been at all commensurate with the force of the Chinese engaged, the Japanese would have found serious difficulty in the want of harmony between the medical service and the intendance. As matters stood the campaign did nothing to thoroughly test the

strength and wisdom of this system. It will be interesting to note in the future whether the trial, as it appears, was such as to advance medical autonomy, so that in the special organization cited the central administration will be placed, as it should, under medical control, the bearer companies themselves being operated by non-medical officers subordinate to the center. Such an arrangement has in it much to commend it to our notice.

The source of supply of the trained regimental and other attendants is not stated, whether from a trained general reserve, or more compact company organizations of the hospital or medical staff corps. The Japanese regulations are marked in their insistence that regimental and bearer aid shall keep touch with the fighting line, and it is apparent that in many ways soldierly qualities are demanded from the officers and men of the medical force. How far this advanced assistance may be possible under a much more destructive fire than was usual in the campaign under review, is open to much doubt; but it is clear that the discipline is valuable, and an illustration is given of which any nation might be proud.

A regiment at Wei-hai-wei was suddenly exposed on an open beach to the flanking fire of half a dozen Chinese gun and torpedo boats at the close range of three and four hundred yards, losing eighty officers and men in a few moments. The regiment sought shelter at once, and the medical force deploying under a continued fire, rescued all, dead and wounded, within twenty minutes. Colonel Taylor witnessed this remarkable demonstration of training and discipline.

In the transport of the sick and wounded there is no mention of any appropriate wheeled vehicle or ambulance, and, in fact, you must have noticed the absence of wheeled transportation from all the tables of allowance. Most of the carriage of the disabled was done by litter, some by the native Chinese carts, the rate of travel seeming to have been about fifteen miles a day. An ambulance jinricksha was used at some of the home receiving ports and base hospitals, and its adaptability to a more extended service deserves consideration. It became a two wheeled protected litter for one patient drawn by one man. The gypsum splint and ash pad antiseptic dressing also appeal for trial in any extemporized field surgery.

The attitude of the central government in subjecting benevolent societies employed in military work to military control cannot be praised too warmly. In no other way can their assistance be fully profitable, and their material be applied with judgment. The wasteful prodigality, and well meant but obstructive intrusion of charitable associations in our civil war should never be repeated.

It may well be that in this brief of Colonel Taylor's elaborate report there are interruptions of continuity, and much entertaining illustration has of necessity disappeared. I think, notwithstanding this shortage, that enough has been given to show how thoroughly the duty of observation was done, and with what refreshing perfection of medical organization it dealt.

THE MEDICAL AND SURGICAL EQUIPMENT OF A FIFTEENTH CENTURY MILITARY EXPEDITION.

BY LIEUTENANT HENRY R. STILES, Assistant Surgeon, U. S. Army.

In 1888 M. Jules Finot, of Lille, presented at a reunion of the Sociétés savantes, a paper entitled, "The Plan of an Expedition Against the Turks, prepared by the Duke of Burgundy, Philip the Good, in January, 1457." This paper brought to notice a document preserved in the Archives of the North, containing, in detail, all the arrangements made by Philip the Good for a crusade against the Turks, who had recently taken Constantinople (May 22, 1453). An extract from this document, covering the report of the surgeons of the Duke of Burgundy, as to the medical and surgical supplies needed for the expedition, was published by M. Ch. Finot, Médecin Aide-Major, in the Arch. de Médecine et de Pharmacie Militaires, July, 1895, and the rarity of authentic accounts of this kind, going back four hundred years, has induced me to present a translation of the "requisition," if one may so call it, as given in M. Finot's article. The fact that disturbances at home prevented the departure of the expedition, though Philip had taken solemn oath to go on the Crusades, does not detract from the value of the report, for the original document shows, by its completeness in every detail, that he intended to keep his oath.

The Duke was at that time a powerful prince and doubtless had a household commensurate with his station. He had his personal servants, his immediate body-guard and his knights-bannerets—in all, not far from two thousand men. And his orders to his surgeons were to submit a report of all that might be needed to care for the sickness and injuries that might occur in his household establishment during a period of three months. History tells us that between 1449 and 1463 the Duke had as physicians, Simon de

Roches, Henri de Wocht, Pons de Lureux, Jehan de Vaylx, Gon-salves de Varzas, Anthoine Patenostre, Jehan Surquet, Jehan Spirinc, Nicole de Vallernesse, maitre Dominique and Pierre de Harlem, and as surgeons, Josse Bringt, Jehan Sans-Pitie, not a bad name for one of his craft, and Guilliame du Bois. But it is impossible to determine to which of these the credit of the report is due, as it has neither signature nor date. But, be that as it may, little seems to have been forgotten, and every emergency, even to the means of treating scorpion-stings and the wounds of poisoned arrows, seems to have been provided for, and in ample measure, if we are to judge of all by the one or two articles on the list with which we can make comparison from our own supply-table.

Estimating the "livre" of that period as 0.5 kilo., we find, for instance, that the supply of jute or oakum (*estoppes*, i.e., *etoupes*) 40 to 50 livres (20 to 25 kilos.) is nearly double our allowance, viz., 10 or 12 kilos for 2,000 men for three months. The "bale of old linen" (*bale de vielx drapiaux*), that is mentioned would, no doubt, have much more than taken the place of our allowance of bandages, 48 dozen, for the same number of men and the same time.

The surgical instruments mentioned in the list seem few in number, but the requisition expressly states that they are needed only to complete an already existing outfit. (*Il nous faut avec les ferments que desja nous avons.*) We are thus unfortunately given very little idea of what comprised the surgeons' armamentarium at that time.

But the list gives us a suggestion as to the character of the treatment of wounds and injuries at that period. Salves and plasters, oils and balsams, some of them simple, others wonderfully complex, each, no doubt, having its special indication and most of them, thanks to their containing aromatics, of some value as mild antiseptics. For the scorping-sting they foreshadowed Hahnemann, and "gave the hair of the dog that bit" in the "Oly de scorpions."

Of the list of internal medicines, some are familiar, others not. The supply of opium, half an ounce, equal to 1-32nd of a livre, or, roughly, 15 grammes, seems ridiculously small.

The following is, as near as may be, a literal translation of the report. The original is written in the French of the fifteenth century, with a sprinkling of Flemish, and it was rather a difficult matter to find exact meanings for some of the words. For many of the remedies I am indebted to the article of M. Finot.

"My much-feared lord, your surgeons humbly make remonstrance to you that, in order to serve you and those of your noble household well during this journey, it is necessary that there be prepared, furnished and provided, of dressings, instruments, ointments, plasters and many other things by means of which they may be able to succor, help and comfort the wounded or other sick, the necessary things which are set down here below."

"We supplicate you very humbly that it may please you to so order your noble pleasure that, we being prepared at all times, you may make use of us when there shall be need."

"In the first place we need, with the instruments which we already have:

III hollow instruments for boring (*terebelle*, probably a corruption of *taravelle*, a word still in use in some parts of France, and doubtless corrupted from *tariere*, which has the meaning given), II male and II female.

Item, we need IIII forceps, II large and II small.

Item, we need II canulated forceps, for extracting barbed darts.

Item, there is needed XL or L livres of jute or oakum.

Item, there is needed a bale of old linen.

Item, there is needed of oil of roses, X or XII livres.

Item, there is needed of good vinegar, XV or XVIII livres.

Item, there is needed of turpentine, XII livres.

Item, sweet ointment, XXX livres, or thereabouts.

Item, of populeon, XX livres.—This is probably the Ung. Populeum, still in the French Codex.

Item, of oil of violets, I.

Item, of plaster of Gennes, VII livres.—Nothing is to be found as to the composition of this.

Item, plaster of Betonica, X livres.—To be found in the French Codex of 1758, under the title Emplastrum de Betonica.

Item, of honey of roses, VII livres.

- And as concerns wounds
Item, of thread to sew the bandages, VI livres.
- Item, for apposteimes (*appostumes*, unopened abscesses or tumors in general) and other such maladies.
- Item, there is needed of white diachylon,
- Item, there is needed of common diachylon, mucilaginous, of each, X livres.
- Item, of emplastrum gracias dei.—Appears in the *Pharmacopoea Lillensis* of 1640. Composed of leaves of betony, pimpernell and vervain, yellow wax, liquid turpentine and mastic.
- Item, of emplastrum apostolicum chirurgicum, of each, IIII livres.
- Item, of basilicon ointment, XII livres.—To be found in the French Codex as late as 1884. It is made up of black pitch, colophane, yellow wax and olive oil.
- Item, unguentum fouchs, VI livres.—In the French Codex of 1884, under the name of Ung. Fuscum or Mother Thecle's ointment.
- Item, unguentum apostolorum, VI livres.—In the *Phar. Lillensis*, 1640, and in the Codex of 1758. It is very complex, having some twelve or more ingredients.
- Item, for old wounds, and ulcers as of the legs and in other places on the body,
- Item, there is needed, of emplastrum dia palma.—To be found in the Codex of 1884.
- Item, emplastrum terra formacio.—Not identified.
- Item, emplastrum cerusum, of each IIII livres.—White lead plaster. In the Codex of 1758.
- Item, camphorated Spanish white,
- Item, of ointment of grey drying oil, of each, V livres.
- Item, lithargeum nitriticum compositum et non-compositum.—In the *Phar. Lillensis*, 1640.
- Item, barlye flour,
- Item, bean flour,
- Item, vetch flour,
- Item, flour of lupins,
- Item, wheat flour, of each, VI livres.

Item, light flour of the mill, three times dried, of wheat, VI livres.

Item, for deformities, fractures, ruptures,

Item, there is needed of powder of myrtillus (bilberry), XII livres.

Item, roses,

Item, alloyne,

Item, camomile flowers,

Item, mellilot (sweet trefoil), of each, II livres.

Item, oil of bitter almonds,

Item, oil of sweet almonds, of each half a livre.

Item, for prick of scorpions, of spurs, of poisoned darts,

Item, there is needed of oil of scorpions, VI ounces.

Item, oil of worms.—In the *Phar. Lillensis* as Oleum Lumbicorum Terrestrium.

Item, oil of artificial balsam, of each, I livre.—Many of the old pharmacopoeas contain formulae for "baumes artificels." It is impossible to determine which formula is meant here.

Item, for salves, spannedraps (sparadrapian adhesive plaster spread on cloth or paper) for sprains of the tendons and other such,

Item, there is needed, emplastrum oxirocicum.—Is probably the Emp. Oxycroceum of the *Phar. Lillensis*, 1640.

Item, emplastrum cyroneum, of each, VI livres.—Emp. Ceroneum of the Codex of 1884.

Item, agrippa.—A very complex formula, to be found in the *Phar. Lillensis* as Ung. Agrippa, containing Rad. Bryoniae, Cucumen annini, Scillae recentis, Iridis nostratis etc., etc., with oil and yellow wax.

Item, dialtea.—Emp. or Ung. Aethocae of the Codex of 1884.

Item, marciaton.—Probably the Ung. Martiatum of the Codex of 1758.

Item, aragon, of each, VI livres.—The Ung. Aragon of the *Phar. Lillensis*, 1640.

Item, for the other maladies suddenly coming upon the human body,

Item, defensive ointment, XVI or XVIII livres.—Is the Ung.

Defensivum of the *Phar. Lillensis*. It contains O1. rosacei omphacini, Cerar flav., Boli armeni, Sanguinis, Draconis, Aceti optimi.

- Item, ointment of roses,
- Item, ceratum Galieni, of each, IIII livres.
- Item, powder of burned alum, II livres.
- Item, powder of socotrine aloes, VI ounces.
- Item, powder of myrrh, VI ounces.
- Item, powder of prepared tutty, IIII ounces.—Impure zinc oxide, used at that time as an antiophthalmic and as a dessicant and cicatrizant.
- Item, powder of golden litharge,
- Item, powder of silver litharge.—The color of litharge (PbO , lead monoxide), depends on the degree of heat to which the metal is subjected in calcination. Moderate heat produces the “golden” litharge, greater heat the “silver.”
- Item, powder of ceruse, of each, I livre.—White lead, Pb_2CO_3 , PbH_2O_2 .
- Item, licum.—*Lycium*, ord. Solanaceae. Held to be astringent and alterative.
- Item, saffran (saffron), of each, VI ounces.
- Item, powder of mastic,
- Item, incense-powder, of each half a livre.
- Item, opium, half an ounce.
- Item, linseed,
- Item, seeds of fengruec.—*Trigonellum femum-grecum*, of the Leguminosae. A mucilaginous, emollient grain, which formerly entered into the manufacture of many ointments, plasters and poultices.
- Item, seeds of poppy, of each VI livres.
- Item, flour of linseed,
- Item, flour of seeds of fengruec, of each, IIII livres.
- Item, lard of fresh pork,
- Item, Viex oint. (Vieux oing. lit. wagon-grease, or melted hogs' fat), of each, II livres.
- Item, dried figs, IIII livres.—These were used for diseases of the mouth and throat; also as an external application to “digest and soften abscesses and hasten suppuration.”

- Item, powder of iris root,
- Item, powder of calamus aromaticus,
- Item, powder of cyperus,
- Item, powder of acorus,—*Acorus verus*. Aperient and stomachic.
- Item, powder of hermodactyl, of each, half a livre.—This name is still given to the roots of certain species of *Colchicum*. It was a "very active and dangerous medicine."
- Item, III large sponges.—The powder of calcined sponges was often used as an alterative.
- Item, galbanum,—The gum-resin of some of the *Ferula*. Used as an antispasmodic.
- Item, aromaticum, of each, I livre.—Probably gum ammoniacum. It was used internally as an expectorant and externally in plaster-masses.
- Item, camphor, IIII ounces.

NOTES AND COMMENTS ON THE FRENCH FIELD
SANITARY SERVICE, AND THE LESSONS
WE MAY LEARN FROM IT.

BY MAJOR VALERY HAVARD, Surgeon, United States Army.

The French army has been completely reorganized, I may say revolutionized, since the Franco-Prussian war, but no part of it more than the medical department, which has steadily developed and expanded, until to-day we may consider it the best exponent of modern field sanitary organization, as well as of the modern humanizing spirit which, unable to prevent, seeks to mitigate the horrors of war.

Until 1882 the French medical staff was under the control of the Intendance, and had no military authority; in that year it was given command of the nurses, but did not become fully emancipated until 1889, when it obtained full control of personnel and material and complete autonomy within its sphere of action.

The latest regulations governing the sanitary service of the French are embodied in the official "Réglement sur le service de santé en campagne," issued in 1893. In no other army are the duties of all concerned so clearly and explicitly formulated. It is interesting to note that the "Réglement" was prepared by a board of eleven officers, only five of whom were medical officers, so that its provisions can in no way be regarded as one-sided or out of harmony or proportion with the other departments; on the contrary, they testify to the enlightened views of line officers and their appreciation of the scope and usefulness of the medical department.

For the instruction and guidance of nurses and litter-bearers a work in two small volumes was published in 1894, "School of the Military Nurse and Litter-Bearer."

First, let me advert briefly to the war organization not only of France, but I may say of all Europe.

An army corps of infantry consists of two divisions; a division of two brigades; a brigade, of two regiments; a regiment, of three battalions, and a battalion, of four companies.

The battalion is the fighting unit, and about 1,000 men strong. It therefore corresponds to our regiment when filled up to its full capacity, while the regiment of three battalions, or 3,000 men, corresponds to our brigade. It is true that efforts are being made in our service to imitate the European organization, but legislation which simply provides for cadres, or paper battalions, without at the same time providing for men to fill them up, will fail to increase the size of our regiments, and there is no reason to believe that the causes which operated to reduce their strength during the War of the Rebellion will not continue to exercise their baneful effects.

For the care of the wounded on the battle-field, three lines of help are provided:

1st., the collecting or dressing stations; 2d, the ambulance stations; 3d, the field hospitals. These lines form the necessary service of the front as now understood and accepted by all civilized nations.

To obtain a correct idea of their location and operation, we must know the general disposition of troops in order of battle as prescribed by present tactics. First is the firing line; 200 or 300 yards in rear is the line of supports; 300 yards further back are the battalion reserves; 400 to 600 yards still further back are the regimental reserves.

The dressing stations, one to each regiment, are just behind the regimental reserves—that is, 1,000 to 2,000 yards from the firing line. This appears a long distance, but it was evidently determined after due consideration; in the “Réglement” of 1884, the dressing stations were to be established just behind the battalion reserves—that is, 500 or 600 yards behind the firing line; the greater distance now enjoined is the natural result of the increased range and destructiveness of firearms. German surgeons agree with the French that no station can be properly organized and operated much nearer than 1,200 yards from the firing line.

But even at that distance much judgment should be exercised. The station must be hidden from the view of the enemy, if possible, behind a hill or ridge; avoiding houses likely to be the objective points of its artillery, and the too close proximity of walls whose fragments, when struck, may do more harm than the projectiles themselves; soft, plowed earth in which shells bury themselves without exploding, is preferable to hard, rocky soil.

The ambulance stations, one for each division, are just in rear of the reserves of the division—that is, at least 2,000 yards from the firing line, not only beyond the range of musket fire, but also beyond the objective aim of the artillery. Preference is given to sheltered points of easy access, with plenty of water, and near roads leading to front and rear. Houses of stone or brick may be selected, especially if protected by other buildings.

The field hospitals, eight for each army corps, are set up behind the corps, sufficiently far to be entirely beyond the oscillations of the battle, yet near enough to be able to send men and supplies to the ambulance station in case of need.

Of these three lines of help, the first two are essentially movable, marching with the units they belong to, advancing and retreating with them, being, as it were, integral parts of the fighting troops. The field hospitals, on the other hand, must remain in loco until all their wounded have been operated and evacuated to the rear.

The general disposition of these lines of help has been carefully elaborated, and seems to be beyond criticism, in all respects a model worthy of our imitation. One lesson, already learned during the War of the Rebellion, is here strongly inculcated,—not to scatter the sanitary personnel and material into small disconnected groups. Our regiments will always be too small to require separate and fully equipped dressing stations; for us, the rule should be to establish only one station for each brigade, but to keep enough men and supplies on hand for a second one in case of need. One ambulance station will suffice for each of our divisions, although it may be divided into several sections capable of operating at separate points.

PERSONNEL.

The medical personnel of an infantry division on war footing, exclusive of officers, is as follows: For the service of the first line, that is for immediate use with the regiment and dressing station, 300 men; for the service of the second line, 216 men.

The 300 men of the first line consist of 252 litter-bearers and 48 nurses, the bearers being made as follows: 52 per regiment (48 privates, 3 corporals and 1 sergeant), 16 for the battalion of chasseurs, 24 for the 6 batteries of artillery and 4 for the company of engineers; the nurses are at the rate of 4 per battalion.

The 216 men of the second line constitute the "Ambulance," or what we may call Ambulance Company.* They are made up of 98 litter-bearers (92 privates and 6 non-commissioned officers), 30 nurses and 88 trainmen, the latter including veterinarian, bicyclist, mechanics, drivers, orderlies, trumpeters etc.

We therefore have, for the service of the front, exclusive of field hospitals, a total personnel of 516 non-commissioned officers and privates. As the division is about 15,000 strong, the proportion of sanitary personnel is just about 3.5 per cent. This is exactly the proportion I laid down in an article published in the Journal of the Military Service Institution for March, 1887, where after studying the conditions governing modern warfare, I formulated the following proposition:

"To each 100 combatants assign 2 men as bearers and nurses for duty with the regiment, and 1.5 men for duty with the divisional ambulance company."

We may congratulate ourselves that we possess an independent hospital corps, specially enlisted for, and an important part of the medical department; upon it, as a secure foundation, all questions of personnel may safely rest, provided, however, we have a well matured scheme of mobilization or organization for war, adapted to our special conditions. Such a scheme still remains a pressing desideratum. In working it out, we must bear in mind that the sanitary personnel consists of two distinct elements: 1st, hospital corps men forming the regular ambulance corps, and 2d, com-

* This designation seems to be more satisfactory than the "Sanitary Detachment" of the Germans, or "Bearer Company" of the English; the latter name would be very confusing since the ambulance company is entirely made up of H. C. men, and contains no so-called company bearers.

pany bearers, or combatants temporarily detached from their companies for sanitary duty with their respective regiments (first line of help) during and immediately after an engagement, rejoining their commands as soon as their services can be spared. Hospital corps men, only, are neutralized by the Geneva Convention and wear the white brassard with the red cross. Our regulations recognize the principle of these two separate elements, and accordingly provide that, in addition to the hospital corps, four privates in each company will be designated and instructed as company bearers.

Some thoughtful and experienced surgeons consider the whole scheme of company bearers as impracticable and destined to complete failure when brought to the test of war; they contend that the colonel and captains of a regiment, in spite of regulations to the contrary, will not permit any part of their effective strength to leave the ranks in presence of the enemy; the more so that very little first aid work can be done near the front until after the first shock of battle. Accordingly they have advised that all the personnel be incorporated into the hospital corps. But this appears very difficult in practice. In the first place, such a wide departure from the established usage of civilized nations would endanger our privileges under the Geneva Convention; then, we would have the singular anomaly of detachments doing habitual duty with regiments and yet being no part of them, thus greatly complicating questions of subsistence, responsibility and discipline; finally, remembering that litter-bearers are only needed during and immediately after a battle it would seem objectionable to crowd the ambulance companies with men for whom, at other times, there would be nothing to do.

Yet I believe that, although advisable to retain the company bearers as a distinct regimental personnel, they should be placed upon a different status, practically that of non-combatants; remaining an integral part of their respective companies, but without arms, since they are never to use them. In camp they may do their share of fatigue duty in addition to their technical training, but on the march, if near the enemy, they are all united under a medical officer in rear of the regiment. In this disarmed condition, no line officer will object to their falling out.

However, in view of the possible difficulty which may occasionally arise to obtain a sufficiency of properly instructed company bearers, it will be wise for us to make our hospital corps proportionately larger than in Europe. Instead of 15, I think it ought to be raised to 20 per 1,000, and we may formulate the following proposition as our general practical working rule: 2 per cent. of company bearers and 2 per cent. of hospital corps men. This proportion will also enable us to supply field hospitals with the necessary personnel.

MATERIAL.

In the French, as well as the German army, every officer, non-com. officer and private carries, in time of war, a first-aid packet in a special pocket. It is intended that we should do likewise, but we may well doubt the possibility of enforcing such a regulation in our service; yet had it only the result of insuring a packet with each officer and non-com. officer, it would be well worth the effort. The French regulation stretcher (*brancard*) has much to recommend it; it is the lightest and probably the best of any used in Europe; but, in that respect, we have no reason to be envious. Our litter has been so perfected that we may fairly consider it the best in the world. Our litter drill has kept pace with the litter, and, after several years of evolution, has reached a degree of excellence in which we may all take pride; it is doubtless the one subject from which the medical department of European armies could learn a useful lesson.

Wheeled stretchers have often been recommended; they were tried by the Germans in the Franco-Prussian war of 1870, but without much success, and thereafter became generally discarded. Recently, however, a change of opinion has taken place in their favor, so that to-day they are used in most European armies. The French "*brancard roulant*" consists of a two-wheeled frame upon which the litter is placed; the wheels can be folded up for packing in wagons; one man draws the vehicle with safety, but not with ease. A two-wheeled stretcher requires a good smooth wagon road and would therefore be of little practical use to us. A one-wheeled vehicle, however, appears to possess certain advantages of which we might avail ourselves; it also re-

quires pretty even ground, but most wood lanes or well trodden paths would admit of its use, even on the battle-field.

Mr. Frederick Remington, the artist, who takes such a keen interest in all things pertaining to military equipment and material, has ingeniously applied the bicycle wheel to the regulation litter in such a way as to greatly facilitate the work of the bearers. His "litter-carrier" simply consists of a wheel with four arms to which the litter is secured, so that the bearers push or draw their load instead of carrying it. It is obvious that such a contrivance is merely an auxiliary to the litter, designed as a practical and efficient help to the bearers, so that, under stress of time, they may be enabled to make more trips or carry their patients further. Viewed in that light, I am inclined to consider it a valuable addition to our transport material.

Of ambulances in France, the supply is small, only two for each regiment of 3,000 men, or 8 per division; there are 14 more held in reserve with the ambulance organization of the army corps headquarters. It is not expected that this supply should be sufficient, and elaborate directions are given to fit all kinds of vehicles for the transport of the wounded. In this respect we are more fortunate, being allowed 3 ambulances for each regiment of 1,000 men. French ambulances are of two kinds, one 4-wheeled, intended for 4 recumbent patients, the other 2-wheeled and drawn by one horse, intended for only 2 recumbent patients. This may have its *raison d'etre* in France, but for us one uniform pattern is preferable.

Our latest regulation ambulance has very good points, but is not yet as perfect as one would wish. Although quite large and rather heavy it carries only two recumbent patients, whose litters are laid directly upon the floor so that there is nothing to save them from the jars and jolts of the very rough ground of the battle-field except the ambulance springs. I have gradually come to the opinion that our ambulance should carry four recumbent patients instead of two. It is so difficult, in the immediate rear of the battle-field where every road is crowded with vehicles, guns and troops, for an ambulance to make its way to the dressing-station that when it gets there it should always be loaded to its full capacity, that is, eight or nine sitting or four recumbent pa-

tients. Our ambulance is quite roomy enough to admit of two tiers of litters, and these should be suspended from straps, the system found most practical and satisfactory.

The French regulations contemplate that each regiment should carry with it the necessary material for its dressing-station, so as to be, at least for a time, independent of ambulance company and field hospital. For this purpose each battalion is followed on the march by a medical one-horse cart containing six panniers with material for 300 dressings, 10 pouches, 8 litters, water-kegs etc. Whether this cart could follow the regiment into action and reach the place finally selected for the station is very much doubted by competent authorities even in the French army. In this country, where roads are fewer and generally bad, it would simply be impossible.

In our service, the supplies for the dressing station are medical and surgical chests, and the pouches carried by H. C. men. As these chests are carried in the ambulances they could not, as a rule, reach the station until after the battle, if at all, for we must bear in mind that the site of a station will hereafter be selected mostly without regard to its accessibility to wagons. But even if by good fortune and skillful management one ambulance should get there, or near there, in good time, the material contained in both chests would prove utterly inadequate; most of it is useless for first aid purposes, and I doubt whether all the available gauze, jute, cotton, felt and bandages would dress more than a dozen patients. Of course the H. C. pouches will help, but something more is required, a more abundant supply of dressings, and the only sure way to get it there is by the use of pack animals; let us have one pack mule to each regiment or, rather, two for each brigade, each mule carrying two panniers full, chiefly of dressing material, that is, of the few articles essential for the provisional and hurried first-aid treatment, and the station will be truly independent, and in a position to save many lives long before ambulances can appear on the scene.

The material of the ambulance station, in the French service, is carried in two surgical wagons, two administrative wagons and eight supply and baggage wagons. Each wagon has its appointed load and is carefully labeled so that any article can be readily

found. It is needless to say that the ambulance station needs a large quantity of varied material, indeed, all the dressings, medicines, instruments and appliances of an ambulant hospital. Therefore, medical and surgical chests carried in ambulances or on pack animals would be miserably insufficient; the material must be brought in wagons; in other words, the "surgical wagon" is indispensable with us as it is in all European armies. We should have a certain number of such wagons, built after an approved pattern, always in readiness to receive their contents for the field.

We appear to be entirely satisfied with our hospital tents which, during and since the War of the Rebellion, have done very good service. It is a question, however, whether there are not, in other armies, other forms of tents, perhaps with superior advantages and worthy of our consideration; thus, the Tollet tent, used by the French, weighs only 230 pounds, shelters 18 lying down patients and presents distinct qualities of comfort and stability. For field hospitals, the French use tents and movable or portable barracks. The latter are preferred whenever a field hospital is to be immobilized, that is, to remain in place for some indefinite time they consist of wood, pasteboard, or composition panels or sections, quickly fitted together into a commodious and stable structure. So far as I know, the best ever devised is "The Ducker patent portable Barrack and Field Hospital," an American invention combining to a remarkable degree most of the comforts and advantages of a permanent structure with the qualities of simplicity, lightness, stability, ease of transportation and erection. In peace or war I know of nothing better for temporary hospitals, and hope that this, or some similar system, may receive the official recognition of the War Department.

In the French service, each divisional ambulance company is also provided, when operating in desert or mountainous countries, with 33 pack animals, 20 pairs of cacolets and 10 pairs of litters. Experience has taught the French and English that this pack transport is exceedingly useful whenever wagons are not available. Considering the topographical nature of much of our territory, and of the adjoining countries, such transport is fully as necessary for us, but, unfortunately, appears to be unattainable. An

effort was made, at the beginning of the War of the Rebellion, to use cacolets and litters, but was soon given up; besides the difficulty of finding sufficiently strong mules, a certain amount of careful and patient training of man and beast is required which seems to be beyond the aptitude of the American soldier. All we have, and ever had, in that line, is the Indian device, the travois, a long litter harnessed to a horse in front and dragging on the ground behind. The travois is certainly better than nothing, but is none the less a primitive, clumsy and painful way of carrying wounded men. Longmore, in his well known manual on transport, devotes just ten lines to the travois ending with the remark that "Such a form of transport could only be used under very special and urgent circumstances." The "very special and urgent circumstance" which has often compelled us to use it was the entire absence of every means of transport; when in such destitute condition, the travois is the easiest improvisation. But a well organized Medical Department does not depend upon improvisations and is always prepared for all probable casualties.

The best kind of pack transport for our service, as I have always contended, is the single mule-litter, that is, a litter fitted to, and carried on, the back of a mule; almost any animal will answer the purpose and no special training is necessary. Several army surgeons have exercised their ingenuity in this direction, especially the late Col. Jos. C. Bailey, but have failed to receive the appreciation and encouragement which they deserved.

IN OPERATION.

After this glance at the personnel and material of the French service, let us see how it works in the field.

On the march, each battalion medical officer has with him the medical cart and the four nurses of the battalion; an ambulance follows each regiment; immediately in rear of the division, ahead of the train, is the ambulance company with all its material.

When an engagement becomes imminent, the litter-bearers of each battalion are directed to fall out and join the medical cart, so that each battalion medical officer has at hand one corporal, twenty privates and the supplies carried in the medical cart. The medical officers of the first battalion stops and awaits the

successive arrival of the personnel and carts of the second and third battalions until all the regimental personnel and material are united under the direction of the chief regimental surgeon, who follows the troops into action and determines the location of the dressing-station.

It is not apparent why each battalion is followed by a medical cart, since, in case of a battle, the three carts of the regiments always unite behind it to form the dressing-station. It would seem more logical to keep them together behind the regiment, with the ambulance.

So long as the troops continue to advance no attempt is made to organize a station; the wounded are attended to on the way and collected into sheltered spots; but as soon as the firing line is stopped, a station is established.

The three medical carts drive to the station if practicable, but if not (as will often be the case), the nurses and bearers take out of it all that they can carry, litters, panniers, pouches etc., put their knapsacks in it, sling their guns over their shoulders and at once proceed to work. The musicians are also directed to the station, where they lay down their instruments, and assist in carrying the wounded.

An important paragraph is that during the action the bearers, under the guidance of the medical officers, "explore the zone between the battalion reserves and the regimental reserves; the zone between the firing line and the battalion reserves is explored as soon as the circumstances of the battle permit." This means that it is deemed impossible for surgeons and men to do any useful work in the immediate rear of the firing line, that anywhere in front of the reserves of the battalion (some 600 yards from the firing line) they would be more exposed than the combatants, without any corresponding gain to the latter. This conclusion appears to have been arrived at recently, for in the "*Réglement*" of 1884, the bearers, as the fight begins, "are directed towards the firing line," which evidently means in front of the reserves.

It is not expected that the ambulances will habitually be able to reach the dressing-station, so that generally the wounded, after being dressed, must be carried on their litters to the point (ambulance relay) at which ambulances are obliged to stop. This

is the separating point between the service of the first line (regimental service) and that of the second line (ambulance service); there the ambulance company receives the wounded and takes all subsequent care of them. Of course this line of separation is mostly theoretical; in practice, the two organizations give each other mutual assistance so far as they are able.

The "Réglement" says nothing regarding the precise nature and method of first aid treatment at the dressing-station, beyond the rule that all possible antiseptic precautions must be taken. German military surgeons appear to have given more special attention to this subject, and a strong tendency has grown among them in favor of dry dressings in the field. Generalarzt J. Port, acting on the principle enunciated by Bergmann and Langenbeck that gunshot wounds may now be considered aseptic, strongly recommends dry occlusive dressings; they may be prepared beforehand, of various sizes, and are quickly secured over the wound by means of a solution of gutta-percha which not only holds the dressing fast, but also renders harmless the microbes lying on the edges of the wound. Therefore the rule he would formulate is: Asepsis for wounds and antisepsis only for the hands of surgeons and nurses. This dry dressing for all wounds in front of the ambulance station is probably destined to play an important part on the battle-field of the future.

The French divisional ambulance company consists of two separable sections, each fully equipped and capable of independent action; only one section is used at first, the second section being in readiness to reinforce it or move on to some other place.

The ambulance station is thoroughly organized and considered, even by the Germans, a model worthy of imitation. In setting it up, four separate rooms or tents are provided:

1st. For the reception of patients, first examination and application of simple dressings.

2nd. For the application of complicated or permanent dressings.

3d. For operations.

4th. For kitchen, lavatory etc.

The personnel is correspondingly divided into four groups, each with its specialized work. An admirable feature of the system is

that the necessary material for each group is right at hand in separate compartments of the surgical wagon.

As the ambulance station must be always in readiness to follow its division, the wounded are evacuated as promptly as practicable toward the field hospitals. Those in such critical condition as to require treatment *in loco* are taken charge of, after the battle, by a section of field hospital.

We may now turn to our own service and see what dispositions of personnel and material would best suit our purposes.

We assume that, in each regiment, the company bearers have been properly instructed by the surgeons, that a sufficient number of them, as provided by regulations, is always in readiness, and that they have their proper quota of non-commissioned officers, say one sergeant and at least one corporal.

On the march, if away from the enemy, the regimental surgeon only needs with him his orderly and the sergeant or corporal of company bearers; the other bearers may remain with their companies. When near the enemy and there is likelihood of a fight, then all the company bearers, on striking camp and before moving out, report to the surgeon and march with him in a body behind the regiment. This seems more practical and effective than to have them fall out from the column whenever a battle is deemed impending. With this personnel is an ambulance detached from the ambulance company.

It is thus seen that, so far, no part of the regular hospital corps company, excepting ambulance and driver, comes in contact with the regiment; but a detachment of it follows each brigade with the two pack mules which carry the panniers full of dressing material as before described. This detachment, consisting of stewards and nurses, will be on hand to organize the dressing-station.

The ambulance company, with all its material, follows in the immediate rear of the division. The field hospitals are in rear of the corps, at least one marching at the head of the train.

As the division approaches the enemy and takes the order of battle, the surgeon of the first regiment, with ambulance and men, halts by the roadside, where he is successively joined by the men and ambulances of the other regiments of the brigade, the

hospital corps detachment and the pack mules. The bearers having secured four litters from each ambulance, the chief surgeon follows the brigade into action with all his men and material, except the ambulances, which remain behind and rejoin the ambulance company in rear of the division.

The lightness and compactness of our regulation litter permit any bearer to carry it on his shoulder almost as conveniently as he would a gun, so that the problem of providing a sufficiency of litters at the front should not be a difficult one for us.

Let us assume that we have three regiments in the brigade, of 800 men each; the chief surgeon will then have three or more surgeons, a hospital corps detachment (say 1 steward, 3 acting stewards and 12 privates) and 48 company bearers (16 per regiment or 2 per cent.); as material he will have four field cases of instruments (each medical officer carrying his own), four orderly pouches, twelve hospital corps pouches, the four panniers brought by the pack animals, and twelve litters.

It is to be noticed that this organization is thoroughly mobilized, can go wherever the troops go, and is sufficient for all the casualties of the first part of the battle.

The ambulance company in the French service is divided into two sections, one for each brigade. We must likewise divide our divisional ambulance company into as many sections, each one complete in itself, as we have brigades, so that on the march, in camp, or when operating independently, each brigade may have part or the whole of its appointed section. During an engagement, each section connects, for the purpose of transporting the wounded, with the dressing-station of its respective brigade.

For the organization and operation of the ambulance station, I know of no way in which we can improve upon the French model.

The field hospitals must be on the alert and establish connections with the ambulance stations as soon as possible, keeping in touch with them so as to be in readiness to afford help in case of a severe conflict, and to take entire charge of the wounded if the ambulance companies must march ahead with the troops. The medical director of the army corps determines, according to the importance of the fight, whether one or more hospitals should be set up.

Such are, in my judgment, the general outlines of the system best adapted to our military conditions, and which would, in the event of war, yield the best results and reflect the greatest credit upon the medical department.

WHAT IS THE MOST PRACTICABLE PLAN OF SANITARY ORGANIZATION FOR ACTIVE SERVICE IN THE UNITED STATES ARMY?

By MAJOR JOHN VANRENSSELAER HOFF, Surgeon, U. S. Army.

It does not admit of dispute that the sanitary personnel and equipment provided for the care of the sick and wounded are, as they are often declared to be, an encumbrance to the fighting parts of an army. But it should be remembered that the sick and wounded are doubly so; on the one hand they weaken an army by lessening its numbers in their own persons; on the other by abstracting healthy men to attend upon them. The unfavorable moral influence which the presence of a body of disabled men always exerts, especially when their necessities are more or less disregarded, should not be forgotten. Therefore the disadvantages attending the having of the means necessary for diminishing the accumulation of the sick and wounded near the scene of action, for ministering to their necessities and hastening their restoration to efficiency, must be balanced against the advantages arising from the employment of those means. But beyond this the troops have a right to the best precaution which can be taken for their protection, as well as for the safety of their lives, should they become endangered by wounds or sickness received in the service of their country. This is a right which has always been conceded by the greatest commanders, as well of ancient as of modern times.—(Longmore.)

But the sanitary department of an army is not alone a conces-

sion to humanity; it is recognized as a military necessity, and as such its perfecting in our service demands of us the most careful consideration. A glance at the sanitary organizations of the armies of the world shows that in principle they are practically identical, but that in details they differ materially. In some of the great Continental armies, which are all standing at the "ready," watching each movement of the neighboring nations, with everything—down to the last strap—prepared for instant mobilization, certain of the work of the direct management and instruction of the field sanitary personnel is taken off the already overweighted shoulders of the medical department, and the duties of the latter are more closely confined to strictly professional work.

The advantages of such an arrangement under existing conditions are certainly many, the chief of which is that medical officers are comparatively few and correspondingly precious, and therefore should be permitted to devote themselves to work that requires special aptitude, training and experience, possessed by only a small number in any community. But it goes without saying that, in order to the successful working of the sanitary department, it must be under the control and direction of its own officers. Strange to say, this is a moot point with the military authorities, generally denied in peace and always conceded in war.

In the armies of France, Germany, Austria, Italy, Russia, Switzerland and Great Britain, every battalion or other military unit has its own medical officer, but only in Russia is the regimental sanitary personnel permanently attached; in the other armies the medical officers interchangeably do regimental and departmental work—in a word, they belong to a distinct department or so-called Staff Corps. Regarding the question of interior economy, management of personnel etc., there is a wide difference. In the Austro-Hungarian Army, for example, the *Arzt* is a physician pure and simple, with practically no other function, while in the French army the medical officer has command over his department in every respect. The development in the other armies is essentially in the direction of the French, which stands for autonomy, and away from Austria, where the medical officer, as such, cuts but a small figure.

While indeed, as aforesaid, the European armies, being always in expectation of war, are always ready therefor, it must not for a moment be presumed that the sanitary department is in peace maintained in a full state of preparation for active service; on the contrary, this department is organized—of course on active service lines—to meet peace requirements, with material always in store equal to the early demands of war. The passage from the one condition to the other is simple; for the garrison hospital etc., of the peace stations, which upon the outbreak of hostilities become the general hospitals of the army, are manned by medical officers and men of the reserves or by civilian practitioners and nurses, thus freeing the active personnel for field duty, it being understood that the latter alone are specially trained in this important military work.

In campaign the lines of assistance are to all intents and purposes the same in every service. Indeed, this could not well be otherwise, as organization is the result of experience, and the best organization is one which by common consent produces the best results.

THE REGIMENTAL SANITARY DETACHMENT.

The first line of assistance embraces the regimental aid, and it must be remarked that this seems to be regarded in most European armies as of an importance not attached to it in the British or possibly our own service. It will be observed that the French and Swiss have *Infirmiers*, the Germans, *Lazareth-Gehülfen*, the Russians, *Feldshers*, etc., a permanent part of the regimental cadre; these, in addition to the so-called company bearers, who, though an important part of the sanitary reserve, are for use only in emergency. During the War of Secession, as we learn from United States regimental records, a certain number of men were detailed from the companies to extra duty in the regimental hospitals, under a paragraph of Regulations which remained in force until the organization of the Hospital Corps in 1887.

From the foregoing it will be seen that of the armies mentioned, the British alone has no permanent battalion (regimental)

sanitary organization, each of its military units having a medical officer temporarily attached, who in the field is assisted by two company bearers from each company. The duties of this very temporary and apparently inadequate organization are presumed to be confined to the extreme first line work. Doubts of its efficiency have already been expressed by some of the medico-military authorities of that service, and it is not believed it will outlast a single severe campaign. Still, so high an authority as Longmore writes that "The system of each regiment taking with it a hospital establishment of its own into the field is an impracticable one in a modern campaign. Independently of the waste in a system which leads to an unnecessary multiplication of articles when a less number would suffice, it has become impossible for troops moving in the field as quickly as they now do to take such bulky stores with them."

Colonel Joseph R. Smith, U. S. Army, says: "Cases are conceivable when certain advantages may render the regimental system of hospitals in an army the most desirable; but economy and efficiency of administration are always with the system of division hospitals."

Back of the regimental aid we find in every service an organization corresponding to the bearer company of the British—variously called, but identical in function—and which is in effect the essential feature of modern military sanitation. This organization establishes the collecting and dressing stations, is supplied with an ample sanitary equipment, and has attached to it wagons of various kinds manned and horsed by the transport service.

Back of this again are the field hospitals, and yet further back the lines of communication and base hospitals, which may be said to complete the sanitary organization of an army in active service.

A glance at the history of our sanitary department cannot fail to impress upon us the fact that whatever successful sanitary organization we may have had—and certainly in the closing years of the war it was very successful—was the result of dearly bought practical experience on the battle-field, and as such should be highly prized, for no one's experience is so valuable to us as our own. We have but to compare the regulations of 1861 with those

of 1865 to obtain a very clear idea of the development of sanitary organization under active service conditions. Nor can we fail to commend the wisdom of the then medico-military authorities in having the results of this experience embodied in a law which is not subject to the mutations of army regulations.

It is not pertinent to the subject of this paper to in anywise enter upon the general question of army organization, or the particular circumstances which influenced that organization with us in 1861-1865, except so far as is possible to determine the strength of the fighting unit upon which that of the sanitary unit depended. We find that the average strength of a regiment of infantry was 500 men and 39 officers, of which number three were medical officers and one a hospital steward. Except these last named, there was no permanently attached sanitary personnel, all others on duty in this department being detailed from the fighting effective, in accordance with a regulation which reads as follows:

Ordinarily, hospital attendants are allowed as follows: to a general hospital one steward, one nurse as ward-master, one nurse to ten patients, one matron to twenty, and one cook to thirty; to a hospital where a command exceeds five companies, one steward, one ward-master, one cook, two matrons, and four nurses; to a post or garrison of one company, one steward and ward-master, one nurse, one cook, and one matron; and for every two companies more, one nurse; at arsenals where the number of enlisted men is not less than fourteen, one matron is allowed. The allowance of hospital attendants for troops in the field will be, for one company, one steward, one nurse, and one cook; for each additional company, one nurse; and for commands of over five companies, one additional cook.*

This elastic regulation is important because it was based upon practical experience covering all conditions of service, was promulgated during our great war, and certainly cannot be ignored in any effort to determine the number of men necessary to the successful working of the first three lines of battle-field sanitary assistance, with which this paper has to do. From this regulation it is seen that, based upon a strength of ten companies (500 effectives), our regimental sanitary detachment in 1861-1865 ordinarily contained, exclusive of medical officers: 1 hospital steward and 12 privates (10 nurses, 2 cooks).

*Regulations, 1863, Part., 1294.

Comparing this with the regimental sanitary organization of other armies, as set forth in the subjoined table,* it will be found that the allowance is extremely liberal, far beyond that of any other army, so far as the strength of the regular sanitary detachment is concerned. But we must recall that during the war of 1861-65 there were no company bearers, these important emergency-sanitary-soldiers having no existence under that distinctive title, though bandsmen and company musicians were used as such. We must also recall that the divisional field hospitals had to be manned through extra duty details from the regiments of the division, and it is reasonable to assume that these were included in the allowance above set forth; indeed, we learn from the medical and surgical history of the war that "three men" (cooks, nurses etc.) were detailed for the occasion from each of the regiments of the division.

As in future wars it is to be presumed that the field hospitals will have an independent personnel, any demand from this source can here be ignored, and the three men provided therefor eliminated, thus leaving the strength of the detachment one hospital steward and nine privates, of whom two should be acting hospital stewards. This, in theory at least, seems to be an efficient detachment, but as a matter of fact it is, even with this deduction in strength, considerably beyond that of any other army. A reg-

*REGIMENTAL SANITARY ORGANIZATION PER 1000 OF STRENGTH.

ARMY OF	MEDICAL OFFICERS.	N. C. O.	PRIVATE, ETC.	CO. BEARERS.
Russia.....	1.25	1	5.75	14
Italy.....	2.33	1	4	16
Switzerland.....	2	2	2	12
France	1.33	1	3	17.33
Germany	2		4	8
Austro-Hungary	2.66		2.66	13.66
Great Britain.....	1	1		20
United States	6	2	24	40
Total, 8.....	18.57	8	45.41	140.99
Average per 1000.....	2.32	1.00	5.68	17.62

imental sanitary personnel based upon the average per thousand men of all armies is, in round numbers: 2 medical officers, 1 hospital steward, 6 privates, 20 company bearers. This, it will be observed, is much less than our own war strength on paper, but it is probable that in actual practice it is a close approximation to the number who were or will be on this duty.

In view of what has heretofore been said on this subject, doubtless it will be asked: Why is any permanent regimental sanitary organization whatever necessary? And, as stated, the British evidently think none is, since they have none; but all other nations have, and it might seem that British experience even has justified its retention. We learn that in the Peninsular War the idea that every regiment should, while in camp or on the march, take care of its own invalids, was carried out with the greatest advantage to the service. "During the ten months' interval between the siege of Bruges and the battle of Vittoria, 95,348 sick and wounded passed through the regimental hospitals, and yet by the assiduous care of the medical officers there were only 5,000 sick on the eve of battle, the ranks being recruited by convalescents who had been properly treated and returned to duty." The regimental dispensary saves many a man to his company who, had he been transferred to sanitary establishments further to the rear, would have been lost to the service.

Moreover, since the question under discussion is, "What is the most practicable plan of sanitary organization for us, in an army made up of volunteers as ours must be," the desirability of the regimental hospital can hardly be questioned, but its function as a dispensary for the treatment of mild, short cases should be clearly understood, since the regimental medical department must be as mobile as any other part of the regiment.

The duty of this detachment on the battle-field would be to establish and maintain the regimental aid station etc. The material of the regimental dispensary differs somewhat in different armies, as does the management thereof and of the personnel. We find, for example, that in the army of Russia, in peace or war, the regimental medical units are completely organized and that the ma-

tériel, tentage etc. which always accompanies the fighting organization (numbering 4,000 men) to which it belongs, is transported in four one-horse carts, and that besides these are four ambulance wagons, each drawn by four horses, and a two-horse wagon to carry thirty-two stretchers, two per company (250 men).

It would seem that this is too extensive a scheme of regimental organization, when we consider the whole plan of modern military sanitation, but it readily permits of expansion from the regiment outward. In the Army of Germany a medical-stores wagon is attached to each regiment (3,000 men), and so we find it in most armies. There is no authority immediately at hand which indicates the amount, if any, of transportation furnished our regimental sanitary departments during the war of 1861-65, but regulations of later date, since changed, allowed one wagon to each regiment; nor is there anything to indicate of what the matériel consisted. This is not surprising when we consider the peculiar condition of organization then obtaining, and the fact that the strength of any military unit, company, regiment, brigade, division, or corps, was an extremely uncertain quantity. Such is equally the case to-day, and is likely to be in any war we may have in the near future. In this view of the situation it would seem that any practicable solution of the question under discussion must be based so far as possible on numbers, rather than upon so-called military units. How thoroughly this fact impressed itself upon our then medico-military authorities as the result of that war, is seen in the extremely elastic organization outlined in the law of March 11, 1864.

There seems, however, to be no question in the minds of most of the foreign military authorities, at least that some sort of a permanent sanitary organization must be attached to each regiment, and that the matériel necessary to its efficiency must have special transport.

Of what should the matériel consist?

The field equipment now furnished by the Medical Department, U. S. A., is based upon the average demands of a thousand men for sixty days, and is believed to be adequate. Its constituent

parts are fully stated in the Standard Supply Table of the Medical Department, and their selection resulted from the large experience of our own officers, together with the combined experience of the medical officers of other armies of the world as set forth in the official publications thereof. This equipment is certainly not perfect, but I doubt not it is the closest approximation to perfection that exists in an army.

The canvas allowance to a regiment, as published in General Orders War Department, Adjutant General's Office, 1895, is three hospital tents and one common tent. While undoubtedly this allowance is based upon practical experience, since the time when that experience was gained the conical-wall tent has been introduced, and because of its extreme convenience may well be made a part of the hospital canvas; it will accommodate quite as many as the hospital tent, requires much less room in transportation, is easily pitched and heated, and altogether for a flying hospital has much to commend it.

It would seem that the official allowance of canvas is liberal for regiments brigaded, and behind which is the divisional field hospital, but it certainly is not beyond the hospital requirements of 1,000 men. Nevertheless, in war, it is not believed that at the utmost the actual regimental allowance will exceed one hospital and one conical-wall tent. Nor could the proposed regimental hospital corps detachment alone well manage more than this. How this dispensary—for such I shall hereafter designate it—is to be furnished, is an interesting question.

The folding field furniture issued by the Medical Department to-day, except the mess (operating) table—certainly the best folding table I ever saw—and the desk, is too bulky for transportation and could form no part of the equipment of a regimental dispensary.

One hand-litter per company must be provided and transported by the Medical Department: These litters might ordinarily serve as cots, to be used when necessary in the dispensary.

The interior economy of the sanitary detachment is worthy of much consideration. The writer's experience is that the detach-

ment should so far as possible maintain its autonomy if it would retain its *esprit*, and consequently its efficiency. It will, however, hardly be practicable for the sanitary detachment of a marching command to maintain a separate mess, and for this purpose it should be attached to the non-commissioned staff and band, except possibly when in permanent camp. Many advantages arise from this combination, especially appreciated by the Russians, who organize all men attached to a regiment, whose function is other than fighting, into a company, designated the non-combatant company. On the other hand, in the German and French armies, the sanitary soldiers mess with the companies of which they form part of the cadre.

The transportation of the material necessary to a regimental dispensary would require a cart or wagon of some kind.

The strength of the regimental Hospital Corps detachment should be maintained by transfer from the companies, or by men enlisted in the section of country in which the regiment was recruited, a guarantee of good men and consequently of good service. From the foregoing we may conclude that the regimental sanitary detachment for one thousand of strength (three battalions) should consist of: * 3 medical officers, 3 non-commissioned officers (1 hospital steward, 2 acting hospital stewards) and 5 privates (1 nurse, 1 cook and 3 orderlies).

In addition, and for emergency only, two suitable men per one hundred of strength should be detailed as company bearers.

THE SANITARY SECTION OR BEARER COMPANY.

Experience has emphasized the fact that "any military body trusting for its medical efficiency to the regimental aid alone, must of necessity come to utter grief when the regiments have to move forward off the battle-field, and the sick and wounded must look for attention to other (untrained) hands than those of their regimental comrades." This was the problem which stared us in

* "Considering then," says Colonel Joseph R. Smith, U. S. Army, "all the circumstances, including the experience of our own and foreign armies, we affirm that the proper number of medical officers to a regiment, as now organized, is one surgeon and two assistant surgeons.

the face when, on September 7, 1862, the Surgeon-General addressed the Secretary of War so pointedly upon the necessity for extra regimental sanitary assistance in our armies. This it was that forced the organization of our ambulance corps, and this it is that has developed the existent plan of military sanitation.

By reference to Army Regulations, 1889, under the caption "Hospital and Ambulance Service in War," omitted in Regulations, 1895, we find that paragraph 1600 provides that "Privates of the Hospital Corps in the field in time of war will be organized into a company for each brigade, with their hospital stewards and acting hospital stewards, under command of an officer of the ambulance service or a medical officer detailed for that purpose. They will habitually camp near the division hospital, etc." What the organization and function of such companies are to be is not stated except in a general way in paragraph 1601, A. R. 1891, that under certain conditions they are "to proceed to the dressing stations or to the relief and care of the wounded." It is reasonable to assume, however, that these regulations were based upon the belief that the same elasticity which was found so useful in our last great war would be equally so in wars to come. Indeed, paragraph 1591 places the whole matter in the hands of the Medical Director of the Army through the medical directors of the army corps who "make all necessary arrangements for the care and transportation of the wounded."

The medical director of each corps is charged with the duty of seeing that during an engagement the wounded will receive attention at the following principal points and in the following order: First, with the line of battle under fire; second, at the first dressing station; third, at the ambulance station; fourth, at the division hospital. He establishes the ambulance stations in the rear, and gives directions concerning the first dressing stations; details the proper number of privates of the Hospital Corps, acting hospital stewards, hospital stewards and medical officers, for duty with the advance line, and for the care and transportation of the wounded between the front line and the first dressing station, the ambulance station, and the division hospital.

No criticism can be made upon the fact that officers and men

will be needed in the various positions above set forth, for they certainly will; but is it not placing upon the medical director a crushing responsibility, a responsibility which he can by no possibility meet until he has formed his crude personnel into permanent military bodies, whose special functions must be defined by easily understood written regulations? Under the present arrangement it cannot be otherwise than that each corps will have a sanitary organization differing from that of every other corps, and men transferred from one to another will have to unlearn and then learn again. Moreover, the value of any particular corps organization will be in direct proportion to the organizing faculty of its senior medical officer, a faculty rare in any calling. Certainly, injustice to our country and service, the military sanitary organization, even if largely theoretical, as it must be in peace time, should be as perfect a paper organization as possible—an organization which could be modified when experience teaches the necessity therefor, but which starts as a substantial entity, based upon the best experience of all armies, and not as a general statement of military sanitary requirements to be met by crude devices, or altogether missed, depending upon the aptitude of the individual organizer.

We find no such general statements in the regulations of other armies. There the place of every man, and each piece of material even, is laid down with a particularity that must astonish those who have failed to appreciate its necessity, and yet are forced to confess that were not such minute details necessary, they would not appear in the regulations of the best organized armies of the world.

The fact that our regulations provided for a company of the Hospital Corps for each brigade leads to the surmise that we borrowed this elaboration of our war ambulance corps from the British, and as a starting point we could probably find no better model. I do not wish to be understood as being of the opinion that the organization of the bearer company of the British Army is either perfect or wholly fitted to the conditions of our service, but it certainly has much to commend it, and we could not begin

our experience at a better point than that which they have reached. Let us consider their organization.

THE BEARER COMPANY.

We learn from Longmore that the first bearer company in the British Army was organized for service in the Transvaal War, 1881, but, owing to the cessation of hostilities, was never actively engaged. The personnel consisted of: 8 medical officers, 3 officers of orderlies, 36 enlisted men of the active army, 106 enlisted men of the Reserve, 1 officer, Army Service Corps, 56 enlisted men, Army Service Corps. Total, 210.

From motives of economy, and probably efficiency as well, the strength of this organization was reduced one-half, leaving it as follows: 3 medical officers, 1 warrant officer (Sergeant major), 1 quartermaster sergeant, 1 compounder, 4 sergeants, 1 bugler, 6 corporals, 47 privates (3 cooks, 32 bearers, 3 servants, 9 supernumeraries). Total 64.

Attached to this company is a detachment of the Army Service Corps, as follows: 1 officer, 1 sergeant, 1 bugler, 2 corporals, 1 collar maker, 1 farrier and 34 privates (29 drivers, 1 servant, 1 cook, 3 supernumeraries). Total, 41.

A total of 105 (all under command of the senior medical officer) for each brigade, 5,000 strength.

The duties of this company are to render first aid to the wounded on the field and at the collecting stations, but chiefly at the dressing station, which it also establishes, and to which it removes the wounded from the collecting station, afterwards transferring them to the field hospital.

Longmore states that the bearer companies are apportioned one to each brigade, but do not form an integral part of it, they are under the authority of the divisional chief medical officer, who, under the general commanding, assigns them as occasion demands.

The percentage of strength of the variously called bearer com-

panies, ambulance corps, sanitary sections or detachments, to the fighting strength, is as follows:*

	PER CENT.
Russia.....	.029
Italy.....	.019
Switzerland.....	.022
France.....	.022
Germany.....	.026
Austro-Hungary.....	.027
Great Britain.....	.021
United States.....	.024
General average.....	<u>.0237</u>

Longmore complains that the British bearer company is too small, "for the reason that the amount of work which might be produced with the excellent material and appliances is lost, because there is not sufficient strength to work it."

I am, however, inclined to believe that $2\frac{1}{2}$ per cent. will be the maximum allowance for any bearer organization we may establish, and I doubt if any one officer can satisfactorily command any such body numbering much over 100.

The question of the organization and distribution of these men is important and perhaps may best be gotten at by a further con-

* BEARER COMPANIES; SANITARY SECTIONS; DETACHMENT; ETC.

ARMY OF	MEDICAL OFFICERS.*	OTHER OFFICERS AND OFFICIALS.*	N. C. O. AND OFFICERS.*	PRIVATE.*
Germany,	7	5	4	245
Russia,	5	2	29	256
Austro-Hungary,	3			276
Italy,	6	3	23	157
Great Britain,	6	2		202
Switzerland,	20	10	20	170
United States,		17.5	20	205
France,	6	6	8	208
Total,	53	45.5	104	1719
Average,	6.6	5.7	13	215

* Per 10,000 men (one division).

sideration of their duties as set forth in the Regulations for the Medical Staff Corps of the British Army.*

Before proceeding further, let us glance for a moment at the wheeled equipment of the bearer company, as important to a full appreciation of its function. It will be remembered that in the British service this with its personnel is attached to the bearer company, from the Army Service Corps (Q. M. D.), of which for the nonce it becomes an integral part. Each company has 10 ambulance wagons, 3 army wagons, 1 for equipment, 1 for stores, 1 for train; 3 carts, 1 for forage, 1 for tentage, 1 for water. There may also be a surgeon or surgery wagon, very much resembling the so-called "medicine wagon," well known in our service in 1861-65.

On the battle-field the bearer company first organizes what the British call a dressing station, but which in the language of our regulations above quoted is known as the ambulance station. The location of this station is so important that I will venture to quote Van Widdern thereupon. "An ideal position for a dressing station is from 1,000 to 2,000 yards in rear of the fighting troops, at a point not exposed to fire, and communicating with the front by a good road. It should be established, if possible, in a building† with large and well-lighted rooms, in sufficient number to hold several hundred wounded lying down, and there should be shade in its vicinity and a plentiful supply of water for drinking and for washing and bathing wounded men, and also, if possible, of straw for bedding."

The personnel of the dressing station consists of: 1 commanding medical officer, 1 junior medical officer, 3 sergeants (1 sergeant major, 1 sergeant compounder, 1 sergeant), 1 corporal, 1 butler, 4 privates, of whom one is a cook.

* For information of the practical working of the bearer company, I am indebted to the excellent monograph of Surgeon-Captain C. J. Addison, A. M. S., on the "Medical Arrangements of an English Army Corps in the Field, etc., 1891."

†Longmore says: "The steps which have been taken to prevent accumulations of wounded for combined treatment in large and often unsuitable buildings, have constituted one of the greatest improvements effected of late years in military medical administration. Nothing has more tended to diminish the preventable mortality among wounded men than the plan of treating them in separate and freely aerated huts or tents, limiting the number collected in one locality etc."

Col. B. J. D. Irwin, U. S. A., writes: "One of the most valuable lessons taught by the experience of the American war of 1861-65 was the demonstration of the inestimable value of the tent as a hospital."

Other military sanitary authorities are equally in favor of the tent and of the segregation of the wounded.

Certain supply wagons of the company under charge of the quarter-master sergeant, two privates detailed as company cooks, the officers' servants, and one supernumerary private, are posted in rear of the dressing station.

The rest of the company moves forward and forms a collecting station (called by us the first dressing station). This station is located just within the zone of infantry fire, is in charge of a sergeant and the ambulance wagons are here posted each with its orderly. The litter-bearers, under command of the remaining medical officer of the company, advance from this point upon the field in two sections, each consisting of one sergeant and sixteen privates, to render first aid to the wounded and to carry them to the collecting station—a work in which they are assisted by the company bearers heretofore mentioned. Such wounded as require it are then loaded into the ambulance wagons and transferred to the dressing station.

It has been stated that the dressing (ambulance) station is the central feature of modern battle-field sanitation. When the wounded reach this point they are fed, carefully examined, classified, and, if immediately necessary, operated upon or redressed, after which, if able to bear transportation, they are sent to a field hospital.

Accepting Van Widdern's ideal preparations for several hundred patients, it might well be remarked that the personnel of the dressing station above described would be totally inadequate to the demands upon it, and so undoubtedly it would, were not arrangements made by which several dressing station sections could be consolidated and details made from available medical officers and men not otherwise engaged. Longmore says: "There is no reason why some of the medical officers attached to regiments and corps should not be lent to assist in the duties of the dressing stations during an action, when there is extra pressure at them," and the British regulations as well as our own, give the principal medical officers full authority to order this. Often-times, indeed, the dressing station for the nonce becomes the field hospital, when for any reason the latter cannot be brought to the front, and when the army to which it belongs has advanced or retreated, and the wounded are too numerous to be moved, or

other causes prevent their movement. The importance of the bearer company cannot be overestimated, and upon its proper organization and management will depend much of the success which will attend the care of the wounded in future wars.

Our ambulance corps of 1861-65 corresponded very closely to the bearer company of to-day. The strength of that organization, according to Colonel Joseph R. Smith, U. S. A., was determined from the regiment (500 men) as a unit, "two regiments constituting a brigade, two brigades a division, and two divisions a corps, 4,000 men in all," about the strength of a European brigade. "To an army corps of this strength the law allows as a maximum 26 ambulances, with four attendant-wagons and 7 officers, 8 non-commissioned officers and 82 privates of the ambulance corps," about 2 per cent. The percentage corresponds with the experience of other armies and may be accepted.

It is hardly to be presumed, however, that the strength of an army corps will in future be that mentioned by Colonel Smith, though this is still the minimum laid down in the regulations as follows: "The division is the basis of organization of an army, and is both a tactical and administrative unit. * * * It is ordinarily composed of two or more brigades of infantry or cavalry (of two or more regiments), but under special circumstances may embrace troops of all arms of the service. * * * An army corps will ordinarily consist of two or more divisions of infantry or cavalry, etc."

It will be observed that the extreme elasticity of organization still obtains, but I am informed that the strength of the division will probably be about 10,000 men.

From the foregoing it will be observed that it would not be practicable to organize an effective bearer company for each brigade as prescribed, but that one or more might be assigned to duty with a division, depending upon the exigencies of the service. Such a company might be organized on the same lines as is the British bearer company, until experience has taught us something better.

THE FIELD HOSPITAL.

We find that in most armies of to-day provision is made for

field hospitals with independent personnel and matériel quite distinct from the lines of sanitary assistance aforementioned. This is an evolution from our experience of 1861-65, when the permanent cadre of our divisional field hospital, so named because one pertained to each division, consisted only of "a surgeon in charge, with an assistant surgeon as executive officer, and a second assistant surgeon as recorder." When in active operation in addition to the foregoing there was an operating staff of three surgeons, aided by three assistant surgeons and the requisite number of nurses, cooks, attendants etc., three from each regiment, all detailed for the occasion from the different regiments of the division." From which it might be supposed that experience had taught us that the personnel necessary to the proper conduct of a field hospital for a division (10,000 men) is: 9 medical officers, 27 privates, as nurse etc. But as a matter of fact the entire medical resources of the division were at the command of the hospital. The medical and surgical history of that war says nothing of any non-commissioned officers as forming part of the permanent cadre of this hospital, but it is reasonable to presume that some such must have been attached, say three hospital stewards, making a total of 39 officers and men.†

The field hospital personnel differs somewhat in different armies, as follows:

THE ARMY OF	MEDICAL OFFICERS.*	OTHER OFFICERS AND OFFICIALS.*	N. C. O. AND OFFICIALS.*	PRIVATE ETC.*
Russia.....	10	4		214
Italy.....	7	3	12	51
Switzerland.....	2	5	4	16
France.....	8	6	10	208
Germany.....	30	18	36	252
Austro-Hungary.....	14	7	4	
Great Britain.....	12	3		198 .
United States.....	9		3	27 (?)
Total, (8).....	92	46	69	966
Average.....	11.5	5.7	8.6	120.7

*Per 10,000 men.

†We must, however, in this connection, consider the fact that especially in the latter part of the war the average strength of a division was scarcely greater than the theoretical strength of a brigade, say 3000 men, which number would be adequately served by the field hospital personnel above described.

This difference in numbers is doubtless due in part to errors in sources of information, but the lack of correspondence is more apparent than real, since the personnel of the field hospitals is reinforced from the bearer companies, sanitary sections, or regimental detachments, which in a measure make up for the seeming deficiency in the former; however, not wholly so. It is reasonable to believe that Germany, whose sanitary personnel is apparently so liberal, would not sacrifice so many bayonets, did she not deem the sacrifice necessary; and if necessary in the army of Germany, why not equally necessary in other armies?

In considering the question of military organization with us, we must not fail to realize, as before mentioned, that any troops we may be called upon to use in war will be volunteers, taken for the most part from the untrained masses of the people. Such troops will require proportionately more officers. Particularly is this so with the sanitary soldier, for while, like his brother of the line, he has "to do and die," unlike him he has also "to reason why," a fact which makes his careful instruction the more necessary. This was our experience during the last war. How then does it happen that our division hospital personnel was so small when compared with that of most other armies? There can be no question about this so far as the minimum is concerned which was prescribed by the Surgeon-General, U. S. A., in March, 1863, as above stated, but it must be understood that any requirements beyond this were met, to the extent, if necessary, of the entire sanitary personnel of the division.

As a practical illustration I quote from a report from a Medical Director of the Army of the Potomac, as set forth in the valuable monograph of Colonel Joseph R. Smith, U. S. A.

The first division of the Second Army Corps numbered 8,000 men in 21 regiments, organized into 4 brigades. To it were allowed for medical purposes 22 hospital tents, 14 army wagons, and 4 medicine wagons. Six of the army wagons were loaded with regimental medical property, four with brigade supplies, two with hospital tents, one with cooking utensils and three hundred rations, and one with blankets, beef stock, whiskey, chloroform, bandages, lint, etc. An operating table was established for each brigade with corresponding (medicine) wagon beside it; otherwise brigade and regimental organizations were ignored.

The surgeons-in-chief were, *ex-officio*, the operating surgeons. Thirty-six regular hospital attendants, in a distinctive uniform, prepared and distributed food, dressed wounds, and generally cared for the patients. During battle the drum corps of the division, 350 men and boys, organized into companies, and, properly officered, was put on duty in the hospital; from these, details were made to pitch and strike tents, move the wounded, procure water and wood, bury the dead, and do general police duty.

A provost guard was present with the hospital during an engagement to arrest malingeringers and restore stragglers to their commands. In a few divisions of the army the hospital tents were pitched by brigades.

From the foregoing report it is impossible to determine the exact strength of the personnel of the field hospital of the first division, Second Army Corps, but, including medical officers, stewards, attendants, teamsters, drum corps, and provost guard, it could not have been much less than five hundred, or about six per cent.—a number apparently much beyond the requirements of the situation. By reference to the table of the personnel of field hospitals in the different armies per 10,000 of strength, we find that the average for all is, in round numbers:—

12 Medical Officers.

6 Transport Officers.

9 Non-Commissioned Officers, Sanitary and Transport.

121 Privates, (Sanitary and Transport.)

148, Total, or 1½%.

But leaving out the armies of Italy, Switzerland, Austro-Hungary, and our own, in which the personnel seems to be inadequate, and is probably erroneously reported, we find that the mean strength of the armies of Russia, France, Germany, and Great Britain, is:—

15 Medical Officers.

8 Transport Officers.

12 Non-Commissioned Officers, (Sanitary and Transport.)

218 Privates, (Sanitary and Transport.)

253, or 2½%.

This mean corresponds very closely to the actual strength of the personnel of the British field hospitals for a division, differing chiefly in the number of non-commissioned officers, which is greater in that service and will be found necessary in our own, and we

may therefore safely continue the consideration of the sanitary organization of that army in its application to our own requirements.

In the Army of Great Britain there are thirteen field hospitals to each army corps (about 40,000 strength, in one cavalry and three infantry divisions,) three with each division, and one with the corps troops (staff, artillery reserve etc.)

The personnel of each is as follows:—

4 Medical Officers,	
1 Quartermaster,	
41 Non-Commissioned Officers and Men of the Medical Staff and Corps,	
26 Non-Commissioned Officers and Men of the Army Service Corps.	
<hr/>	
72, Total.	

The transportation consists of:—

6 Army Wagons for Supplies Pertaining to the Hospital,	
1 Army Wagon for Supplies Pertaining to the Transport,	
{ 1 for Tents,	
4 Carts,	{ 1 for Forage,
	{ 2 for Water.

Each hospital will accommodate one hundred patients, and is divisible into half-hospitals.

To all the field sanitary units of foreign armies, the transport, and personnel therefor, is attached from the train troops, which for the nonce become an integral part of the unit. This arrangement is of great convenience. During the latter part of our war the ambulance corps was practically supplied with its transportation in this way, for, while we had no train troops, the Quartermaster's Department, as the war progressed, organized an exceedingly efficient transport service, the like of which was probably never before seen.

Much of the trouble, however, that the Medical Department encountered before the organization of the ambulance corps, arose from the indisposition of the Quartermaster's Department to relinquish its control over the transportation necessary to the actual work of the Medical Department, and it was only when the transportation properly pertaining to it came under the command of the latter that the field sanitary service became thoroughly efficient.

One has but to read the medical history of the early part of that war to be thoroughly convinced of this fact, nor were we singular in this respect. Longmore says: "Sad experience taught the British military authorities the necessity for a defined scale of hospital equipment for every battalion, brigade, and division of an army, and for the explicit allotment of horse and wheel transport for its conveyance." It would seem to go without saying that the efficiency of one military department should never be wholly dependent upon another which at best can have but little knowledge of its necessities. Nevertheless, we can hardly hope that our sanitary department will be in the immediate future, completely autonomous; hence any plea of organization at present feasible must look to the attachment of transport from the Quartermaster's Department, with insistence by the Medical Department upon compliance with the provisions of the law which gives the latter complete control thereof when so attached. This is vital, and any scheme of sanitary organization which does not comprehend such control, no matter how perfect otherwise, must prove non-effective.

Returning to the consideration of the field hospital, we find that our proposed organization must provide separate field-hospital accommodation for the invalids of each aggregation of three thousand men, however they may be organized; and we also find that the personnel of such a hospital must number about four medical officers and forty-one non-commissioned officers and men of the sanitary corps, exclusive of the personnel of the transport corps, which will number, say, one officer and twenty-six non-commissioned officers and men.

Back of the field hospital we will not go. The organization of the lines of communication and base hospitals is a problem of great importance, worthy of the deepest consideration, upon which the writer hopes to, at some future time, present his views. The general hospital, beyond the theatre of war, does not in its interior economy differ materially from that in civil life.

In view of the foregoing, were war declared to-morrow, what law or regulation could be formulated that would place the sanitary department in a position to meet the demands of active service? The following is offered as practicable answer.

First: A regimental detachment, consisting of:

- 3 Medical Officers,
- 3 Non-Commissioned Officers, and
- 5 Privates,

could be organized *pari passu* with the regiment (3 batts., 1200 men); 0.9 per cent.

This detachment, when properly equipped, would easily meet the current requirements of the regiment to which it was attached, and no further consideration would be given to this point until the regiment had been brigaded and assigned to a division.

Second: At the time requisition is made upon the several States for their quota of troops, the authorities should be notified that a certain percentage of the number enlisted must be for the sanitary corps, and that these were to be selected under the direction of the Surgeon-General of the State. The recruits for the sanitary corps should rendezvous at the State medical depots, for preliminary instruction and organization into bearer companies and field-hospital detachments.

The bearer company should consist of:

- 3 Medical Officers,
 - 13 Non-Commissioned Officers,
 - 1 Musician, and
 - 47 Privates.
-
- 64, Total.

The field hospital detachment should consist of:

- 4 Medical Officers,
 - 1 Other Officer,
 - 13 Non-Commissioned Officers,
 - 28 Privates.
-
- 46, Total.

A bearer company and a field-hospital detachment should be raised for each three thousand troops furnished by a State, 3.7 per cent.

The proposed organization provides a sanitary personnel of 4.6 per cent., which it is believed will be entirely adequate to meet ordinary requirements. Under extraordinary conditions, reinforcement to the extent of two per cent. may be looked for from

the emergency personnel, the so-called company bearers who will probably, as in the past, be detailed from the musicians.

If the average strength of our regiments should in future wars be five hundred, as it was during the last war, which is quite unlikely, the number of medical officers under the proposed scheme is liberal; but when we consider the fact that upon any occasion hardly more than sixty per cent. of the paper strength of an army is "for duty," the allowance is not too liberal, since we will not actually have from front to rear more than one medical officer to two hundred of fighting strength.

The foregoing is believed by the writer to be a fair answer to the question: "What is the most practicable plan of sanitary organization for active service in the United States Army?"

With us, to-day, military organization and training are only important as a preparation for war.

The management and instruction of any small body of men for any ordinary purpose is so simple a matter as to require no remark; but when that small body is representative, as is our military sanitary department, of a great body into which it will expand, when the occasion demands, and of which it will become the leaven leavening the whole loaf, the importance of its proper organization and training becomes apparent, always remembering that "in war only that which is simple can attain success, therefore that alone which is simple must be taught and practiced during peace."

CO-OPERATION IN PUBLIC SANITATION.

By COMMANDER JOHN C. WISE, Medical Inspector, U. S. Navy.

It would seem axiomatic that in the consideration and execution of sanitary work, either public or private, if it be of any magnitude, the direction rest in the hands of a body whose composition should represent the many sides of important questions arising in such connection.

To the medical profession belong the causation of disease and the best means of prevention; to the engineer pertain the points of feasibility and execution; to the legal element, all matters incident to rights of way, riparian privilege, and many others, are referred, while the capitalists and business men will be the financiers of a given project.

Experience has demonstrated that only from such a constituted board, working harmoniously and in full co-operation, can any results of a definite and permanent character be expected.

The city of Washington is an example of misdirection in this regard; Congress is not illiberal, we well know, for in many respects our National Capital commands all admiration; but the present undesirable condition of affairs results from a division of duties which is impracticable, and an assumption of function which is not useful.

A committee of Congress is the highest source of legislative authority, the executive being represented by a board of Commissioners, one member of which is an officer of the Engineer Corps of the Army; with this exception there is no one of technical education among its members.

There is a Health Department which, in so far as its functions

and powers extend, does its duty in regard to inspection, vital statistics, etc. In addition to this the Medical Society of the District, is one of the most active and capable in our country. It is doing splendid work in the investigation of disease and the education of public opinion. Now in these elements we have the intelligence, the earnestness, and the authority to conceive, execute and administer, yet inasmuch as there is no co-operation of these several bodies, the results obtained are necessarily inadequate and inefficient.

It is not purposed here to detail this condition which so illustrates the futility of sanitary work, projected and carried out without due consideration of the subject in every aspect, but rather to succinctly state the topography and sanitary status of a locality, and to show how engineering works of considerable magnitude, undertaken without counting well known factors in disease production, resulted in an enormous increase in the sick rate.

To specifically detail the results when sanitary administration is in the hands of different bodies, whose operations have no relation, the severe epidemic of malarial fever at the Navy Yard, Washington, is markedly in point.

For the dual purpose of improving navigation of the Anacostia river, and benefiting the sanitary condition of the adjacent territory, the main channel of the river was dredged, and the flats thereby considerably raised. This had hitherto been in great part covered by water, or exposed only for a part of the day; but now the action of the sun on the soil, exposed or covered to a slight depth, continued most of the day. Cross-sections of the flats were made by wide channels; numerous isles were thus formed, raised at the circumference; so many basins indeed, partially filled, and never emptied. In addition to the exposed highly organic soil, these basins were filled with the sewage pouring into the river, and the only means of outflow was by evaporation. If a gigantic experiment for the manufacture of plasmodium had been devised, it could not have succeeded more admirably.

The Medical Officer of the Yard repeatedly called attention to the increase of disease. In a special report to the Bureau of Medicine and Surgery in 1894, Surgeon Gravatt, U. S. Navy, gave a statistical showing as follows, on this point:

INCREASE IN MALARIAL DISEASE FROM 1887 TO 1894.

YEAR.	SECOND QUARTER.	THIRD QUARTER.	FOURTH QUARTER.	GROSS PER ENT.
1887	3	2	1	8
1888	3	5	3	13
1889	5	2	2	12
1890	0	1	1	3
1891	1	5	1	9
1892	5	12	17	45
1893	7	36	10	70
1894	8	22	4	40

During the third quarter of 1895, malarial disease was epidemic, one hundred per cent of the seamen and ninety-six per cent of the marines were attacked. The town of Anacostia, directly to leeward of the flats in the river, was so much affected, that it is said there was not a residence in which one or more cases of fever did not exist. Comment on these facts and figures is absolutely unnecessary.

The operations of the Engineers, on the Anacostia, were identical in the results to those reported by officers of the East India Medical Service, as happening in the province of Burdwan. The soil of this province, though alluvial, is dry, and until the past few years it was more salubrious than all other districts of the Gangetic delta. The drainage of the district became obstructed by the filling up of its natural outlets, the result being a wet soil, the development of malaria and an alarming increase in the death rate.

The splendid results achieved by the Massachusetts State Board of Health cannot be too fully set forth to those whose duty has much to do with preventive medicine, and it should be well borne in mind, that if any one factor is to be selected, as contributing more largely to this success, it must be conceded to be the wisdom which constituted the personnel of the Board, and the unanimity and harmony which marked its work.

So great has been the success achieved, that the methods of this

board will remain a lasting model for all others, not only at home, but abroad, as its aid has been invoked by the sanitary authorities of London, in regard to the water supply of that great city.

Recognizing the many and varied problems involved, great sagacity was shown in making the membership as varied: Dr. Walcott, the greatest authority on hygiene in the state, was made its President; Dr. Draper, Professor of Legal Medicine in Harvard, and Dr. Jones, Professor of Hygiene in Boston University, liberally represented the medical profession; the other members were Thornton K. Lothrop, a prominent lawyer, Julius Appleton, a paper manufacturer, and James White, capitalist.

Dr. S. W. Abott, an authority on vital statistics, was chosen Secretary, and Frederick P. Stearns, an engineer of high reputation, was made Chief Engineer of the Board. Thus constituted, the Board has worked in its various departments harmoniously, and the intelligent and practical results attained are the best evidences of the wisdom of representing all the cognate interests involved.

The work of this board is a matter of history, and can be noticed here but briefly.

The experimental station at Lawrence was entirely novel in sanitary matters. Its primary object was to determine "The best method of the disposal of sewage on land." In this experiment a number of large tanks $\frac{1}{20}$ of an acre in area, and filled with soils, varying from muck and loam to fine sand and coarse gravel, were installed to determine their purifying capacity. The sewage was drawn directly from the main sewers of the city of Lawrence. The experiment was in every way successful, proving that the land disposal of sewage is as feasible in America as in Europe.

The normal chlorine map of Massachusetts, is another contribution of this board. By the determination of iso-chlors, or lines of equal chlorine, one could see at a glance, the normal chlorine, so essential when estimating organic matter as chlorine.

The investigations of the epidemics of typhoid fever at Lowell and Lawrence are especially instructive when we consider the similarity of conditions in many of our great cities.

Lowell and Lawrence used the unpurified water of the Merrimac, as Washington uses that of the Potomac.

Experiments upon the water supply by intermittent filtration were urged; a municipal filter two and a half acres in area was designed, and put in operation, and the ratio of typhoid sank to the level of that in surrounding cities.

No community can be happy or prosperous if it is not healthy, Hamburg in its cholera epidemic had a severe lesson, and learned that sewage emptied into a river must be so far beyond the point of water supply as to prevent the possibility of pollution.

It is scarcely credible at this date, from insufficient etiological knowledge we must suppose, that there are large cities in our country whose water-supply is delivered on that most dangerous and fallacious hypothesis, viz: that river water purifies itself in a course of thirteen miles. A very humble practitioner, in these days of bacteriological research, can ably advise the most distinguished of engineers, for while all will admit the purifying action of oxidation, deposition and dilution in running water, there are those who naturally are not authorities on the lengthened vitality of disease germs, or their extra-corporeal life-history.

It is very largely in attention to details of this kind, seemingly so insignificant, but fraught with tremendous influence for the weal or woe of a community, that the older civilizations of Europe have shown themselves so much superior to our modern commonwealths. Public hygiene should play no part in practical politics, and, like kindred subjects depending exclusively on their importance, or humane side, for consideration, are very generally neglected.

COLOR THE CANVAS OF HOSPITAL TENTS.

BY CAPTAIN MYLES STANDISH, Assistant Surgeon, M. V. M.

Anyone who has stretched himself on a bed in a tent made of the ordinary white canvas, when the sun was high on a cloudless July day, must have noticed the intense white glare which comes from the covering spread above his head. This is perhaps more noticeable to the volunteer of our National Guard, accustomed, as he very likely is, to urban life, than to the old campaigner inured to the sun's rays in the open country. Nevertheless, a condition of affairs which is uncomfortable to normal eyes under approximately normal conditions must be a source of actual injury to the eyes in a pathological condition, so that it seems advisable to me that we spend a few moments considering the subject and what should be done to remedy the evil. In the first place, the eye is constructed to receive bright lights from above and not from below. Above, the brows project and screen the sclera from the direct impact of the sun's rays and the intense different light coming from the sky. Below, the bony orbit does not project so far forward, and the sclera is more exposed. This does no harm under ordinary conditions, from the fact that in nature the reflections from the ground are tempered by the green grass and the color of the soil. That this is true will be apparent to anyone who is exposed to the rays of the sun reflected from water, snow, white sand etc. The fact that the discomfort to the eyes from reflected light from snow, water etc. is due to the light which comes from an unusual direction and illuminates the eye through the sclera, was curiously demonstrated in my own case during a winter vacation which I took in the White Mountains several years ago. I had taken to the Mountains with me several pairs of

dark glasses to determine by personal experience the relative value of green, blue and smoked glasses as a protection against light reflected from the snow. In conversation upon the subject while there, Prof. Goodale, the well-known botanist of Harvard University, related to me that several years before he had visited a region in New Zealand where the party were obliged to travel for some time over a white, chalky deposit, and the native guides had directed them to blacken their cheeks and lids to prevent the light from hurting the eyes. Before thinking this over, it occurred to me that the protection, if of any value, must be due to the blackening of the lower lids, the shutting off the light from the sclera below. An opportunity soon presented itself for a trial of the experiment. We had a light fall of about two inches of fine dry snow followed by a brilliant clear day. Near where we were stopping was a large field, and the sun was so bright that I could not cross it without closing my eyes to a narrow slit. With smoked glasses I found I could keep my eyes reasonably open. I thereupon returned to the house, oiled the lower lids and blackened them with burnt cork, and upon going out on the field again found to my surprise that I could walk about with my eyes open as wide as under ordinary circumstances and as well or better than when wearing the dark glasses. Upon removing the black from the lids the discomfort was as great as ever. The application of this observation to the sick man in a hospital tent is obvious. He is not sitting up but lying down, and in that position the lower portion of the globe of the eye is exposed to the light of the intensely illuminated white canvas which forms the sloping roof of the tent.

That this glare can do harm to the normal eye needs no proof, as the only too frequent experience of travelers in snow covered regions abundantly testifies. What then may happen to the sick man whose eyes from the nature of his disease may already be in a pathological condition? Rheumatism, syphilis, the acute fevers and the nephritic diseases all have pathological conditions of the eyes as frequent complications, which would certainly be rendered much worse by such an abnormal exposure to light, if indeed it did not produce the complications themselves, to the great impairment of sight for the rest of the patient's life.

The remedy for this condition of affairs is so simple that it is

strange that it has not been applied before—*viz.*, color the canvas walls of the hospital tents.

As to the color, the exact shade would probably have to be determined by actual experiment, and having had no experience in the matter I can only state the general laws which should govern such experiments.

The general rule is that the colors at the red-yellow end of the spectrum are irritating to the human eyes, and that the colors at the blue-green end of the spectrum are harmless or grateful to the eye, until extreme violet is reached, which is again irritating.

From these general laws it would seem that a pale blue or olive green would be the safest color. I am satisfied that such tents would avert many an ocular catastrophe from the sick and be a source of comfort to all, sick or well, who were obliged to remain constantly in them.

WHAT STANDARD OF VISUAL ACUITY SHOULD BE REQUIRED OF THE ENLISTED MEN OF OUR MILITARY SERVICES?

BY CAPTAIN J. M. BANISTER, Assistant Surgeon, U. S. Army.

That the possession of a useful degree of visual acuity is an essential qualification in a soldier, all military surgeons will admit. The daily exigencies of the service, to mention which in an assemblage of the character of the present one, would be an act of supererogation on my part, absolutely demand the exercise of such a degree of vision. Hence, in order that we may both secure efficient soldiers and prevent the entrance into the service of men useless through visual defects, a standard of visual acuity must be adopted. It is also admissible to assume that two different standards might with propriety be chosen, one for peace, when eligible recruits are abundant, which should be made exacting, and a second, and lower, standard for war, which, while it may not secure, as a rule, men of the most acute vision, may yet permit of the enlistment of recruits with fairly useful sight, at a time when the services of every able-bodied man will be sorely needed, and when we can not afford to be too exacting, or too refined in our tastes concerning absolute visual acuity. In times of national peril every man who can see well enough to recognize the enemy and to aim and fire his piece with moderate accuracy, provided that he has no organic disease of either eye, will be valuable, even though his visual acuity may fall considerably below an artificial standard.

I shall, therefore, attempt to discuss my subject under the two heads under which it naturally falls, first the visual standard that should be required in time of peace, and secondly the standard which should be required during war.

I. VISUAL STANDARD IN PEACE. In our regular army during peace we can afford to be very exacting in our requirements concerning visual acuteness, since we have an abundance of material from which to select our recruits, and hence are at liberty to pick and choose. In European armies, which must be maintained constantly on a virtual war footing, and in which compulsory service is, as a rule, required of the entire male population, the standard of vision must of necessity be much lower than ours else their armed strength could not be well maintained. The necessity with them of a lower standard than ours is also accentuated by the fact that in most of the countries of Europe myopic errors of refraction are excessively common, and especially is this the case in Germany and Austria. European armies, therefore, are recruited with a view to possibly immediate hostilities, and hence their regular, or peace, standard of vision must be their war standard as well.

In times of peace no applicant for a *first enlistment* in our service, with an exception to be presently noted, should be accepted whose visual acuity fails to reach $\frac{20}{36}$ in each eye, or in other words, who fails to read number twenty of Snellen's types at twenty feet with each eye, no correction by glasses being allowed in this entrance examination. This is the standard adopted by General Orders No. 39, Adjutant General's Office, June 7th, 1887, and is, besides, the standard of normal vision which has long been in use by oculists the world over. This ability to read number twenty of Snellen's types at twenty feet proves that the applicant for enlistment has the power of recognizing the *form* of an object which subtends an angle of five minutes at the nodal point of the eye. An exception should be made to this otherwise rigid requirement in the case of *specially desirable* men applying for enlistment in the Hospital Corps, *provided that such applicants be able to reach the required standard with the proper correction of existing refractive error by lenses*. These men I should consider fit for enlistment if their naked-eye vision should range from $\frac{20}{36}$ to $\frac{20}{40}$. Should vision in either eye, without glasses, fall below $\frac{20}{40}$, I would advise rejection. The ability to reach the standard of $\frac{20}{36}$ with glasses, would almost certainly preclude the possibility of disease of the fundus oculi, or opacities of the media. By "specially desirable" men, I mean those who have had some technical train-

ing and are desirous of entering the Hospital Corps with a view to reaching the grade of hospital steward. The regular standard of $\frac{2}{3}0$ with each eye, without glasses, should be demanded of all applicants for ordinary enlistment in this corps.

In the case of *re-enlistments* in any branch of the service, the candidate should be accepted even if his naked-eye vision should fall below $\frac{2}{3}0$, provided that he be free from ocular disease, and provided that he be able to reach the standard with each eye with the assistance of glasses. The fact, in such cases of re-enlistment, that a naked-eye visual acuity of $\frac{2}{3}0$ was possessed at the time of the examination for the first enlistment, would exclude the existence of more than moderate refractive error; and the power to reach the normal standard, after proper correction by lenses, at the examination for reenlistment, will furnish positive evidence that the retinal images can be accurately interpreted when sharply defined, and that the failure to reach the standard with the naked eye must be attributed to the natural loss of accommodation occurring during the years which have elapsed since the first examination, with a commensurate decline in the power to overcome the refractive error by accommodative effort. In this examination for visual acuity Snellen's types should invariably be used, as the test is the power to recognize form, not to note the mere presence of a definite number of circular black spots on a white card, even though each of these spots does subtend an angle of five minutes at the nodal point when placed at twenty feet from the recruit. We are not trying in this examination to find men who can detect the *presence of something* which subtends such an angle, since many with marked refractive error can do that. What we are looking for is the power to recognize what that "something" really is—in short, the *recognition of form*.

Hence the method formerly in vogue in our service of making the applicant for enlistment count the number of circular black spots $\frac{1}{16}$ inch in diameter on a white card, placed at twenty feet, was fallacious; and, in fact, was no accurate test at all. It was wisely abolished, and I trust will never be revived.

It will be necessary now to briefly explain what is meant by the terms far point, near point, accommodation, emmetropia, myopia, hypermetropia, and astigmatism, as a proper appreciation of the

meaning of these terms is essential to a clear understanding of what is contained in the following pages.

(a) The *far point* is that point for which the eye is adjusted when the accommodation is at rest.

(b) The *near point* is that point for which the eye is adjusted when the full power of the accommodation is called into play.

(c) *Accommodation* is the power possessed by the eye of altering its focus, as may be necessary for the proper perception of near objects or objects within infinity. The exercise of this power is essential also in the case of ametropic individuals of the hypermetropic type (*i. e.*, those affected with simple hypermetropia, or the two forms of hypermetropic astigmatism) to secure for them distinct vision even at a distance, *i. e.*, twenty feet and beyond. The amount of active accommodation necessary in these cases is directly proportional to the degree of the refractive error, since by the exercise of this power the error must be overcome, and the eye adapted to parallel rays before distant objects can be distinctly seen. Hence it can be appreciated that this power has a very direct bearing upon our tests of the visual acuity of recruits. Accommodation is due to the action of the ciliary muscle, which by its contraction draws forward the choroid, and thus relaxes the suspensory ligament of the lens, or zonula of Zinn; in consequence of which relaxation the inherent elasticity of the crystalline lens is enabled to assert itself, with a resulting increase in the convexity of the latter. This increase in the convexity of the lens enables rays of light emanating from near objects to be properly focussed upon the retina, and also enables the eye in certain refractive conditions, before mentioned, to temporarily overcome its error, and see at a distance with distinctness. In the normal, or emmetropic eye, no accommodation is necessary for objects at twenty feet or beyond, because rays coming from this distance are virtually parallel, and the emmetropic eye is adjusted to such rays when the accommodation is completely relaxed. The amount of accommodation necessary to distinct vision within twenty feet and the distance of the object from the eye are inversely proportional—the nearer the object, the greater the accommodative effort necessary. This power does not remain fixed during life, but at the age of ten years begins to decline, and

continues to do so until the zero limit is reached at about seventy years of age. The following table taken from Landolt gives the power of accommodation at different ages, and is introduced here for a special reason.

YEARS OF AGE.	POWER OF ACCOMMODATION.
10	14 D
15	12 D
20	10 D
25	8.50D
30	7.00D
35	5.50D
40 *	4.50D
45	3.50D
50	2.50D
55	1.75D
60	1.00D

This failure of the accommodation with increasing years is not owing to any special decline in the strength of the ciliary muscle, but is due to the fact that the elasticity of the crystalline lens progressively diminishes, and, as a result, the contractions of the ciliary muscle are not followed by a commensurate increase in the convexity of the lens. What is commonly called *presbyopia* is not a refractive condition, as is so frequently supposed. This condition is induced by failure of accommodation incident to age, and is said to be established when the near point recedes beyond 22 cm. In the emmetropic eye presbyopia shows itself, as a rule, at about forty-five years of age. To see small type at 22 cm. requires a positive accommodative effort of 4.50 D. By reference to the above table it will be seen that at this age the amplitude of the accommodation is only 3.50 D, the near point having therefore receded from 22 cm. to about 29 cm. In this case the accommodation is defective to the amount of 1.00 D, and hence a +1.00 D lens must be placed before the eye to enable the individual to read the type at 22 cm. Presbyopia comes to all alike, no matter what the type of the refraction may be, except in the case of myopes of 4.50 D of error, and above. The far point of a myope of 4.50 D will be located at 22 cm. and hence such an individual can read type at this point with absolutely relaxed accommodation, provided, of course, that his eyes are free from disease, and have

the necessary visual acuity. In the case of hypermetropes, who are required to make constant demands upon their accommodation for the distant and near vision, presbyopia comes on early.

(d) *Emmetropia* is the theoretically normal state of refraction, and is that refractive condition which, with relaxed accommodation, allows parallel rays of light to be focussed upon the retina. In emmetropia, therefore, the retina is situated at the focus of the dioptric system. Such an eye is adapted to parallel rays, and the far point is at infinity.

(e) *Myopia* (near sight) is that refractive condition in which the retina is behind the focus of the dioptric system. Hence parallel rays are brought to a focus in front of the retina. In this condition the eye-ball is virtually too long in the antero-posterior diameter. Such an eye is adapted to divergent rays, and the far point is at a finite distance in front of the cornea.

A myope, manifestly, cannot improve his distant vision by accommodative effort, for by exercise of this power he will make his eye still more highly refractive, and thus artificially increase his defect in vision for the time being, a fact of practical importance in the examination of recruits.

(f) *Hypermetropia* (far sight) is that refractive condition in which the retina is in front of the focus of the dioptric system. Consequently, when the accommodation is relaxed, parallel rays are brought to a focus behind the retina. The far point, in this case, is behind the retina, and negative. In hypermetropia the eye-ball is virtually too short in the antero-posterior diameter. This type of eye is adapted to convergent rays, which do not exist in nature, and hence accommodation is necessary for all distances, both far and near; since by this means alone can parallel, or divergent, rays be given the degree of convergence required for accurate focussing upon the retina.

(g) *Astigmatism* (α privative, $\delta\tau\gamma\mu\alpha$, a point) is that refractive condition in which the different meridians of the refractive apparatus have different powers of refraction, and hence the rays of a cylinder of light entering the eye are not brought to a focus at one point. The meridians of greatest and least refraction are at right angles to each other, and the refractive power of the intervening meridians diminishes gradually from that of the

meridian of greatest to that of the meridian of least refraction. This constitutes regular astigmatism, which falls within the scope of this paper. Regular astigmatism is subdivided into five varieties, which are individually determined by the relative positions of the retina and foci of the principal meridians. The principal meridians in any given case are the meridians of greatest and least refraction.

1. Simple hypermetropic astigmatism. Here the focus of one principal meridian is *on* the retina, that of the other, or meridian of least refraction, is *behind* the retina; the former meridian being emmetropic, the latter hypermetropic.

2. Compound hypermetropic astigmatism. In this form the retina is *in front of the foci* of both principal meridians, which are both hypermetropic, therefore, though in different degrees.

3. Simple myopic astigmatism. In this variety one principal meridian is emmetropic and the other myopic, or the focus of the first is *on* the retina, and that of the second *in front of* the retina.

4. Compound myopic astigmatism. Here both principal meridians are myopic, but in different degrees; and hence the foci of both are *in front of* the retina.

5. Mixed astigmatism. In this form of refractive error, one principal meridian is hypermetropic, and the other myopic, the retina being thus between the foci of said meridians.

It must be understood that the static refraction, or the refraction when the accommodation is at perfect rest, is meant in the above description of refractive conditions.

I shall now attempt to make an application of the facts stated in the foregoing remarks upon refraction and accommodation, to the visual examination of recruits.

The applicant for enlistment, or re-enlistment, with an emmetropic eye and normal visual acuity will be able to read number twenty of Snellen's types at twenty feet, *no matter what his age may be*, since accommodation has no part whatever to play in this case.

In the examination for the first enlistment our standard of $\frac{20}{20}$ will exclude myopes, as well as those affected with myopic or mixed astigmatism, unless these errors be of very trivial degree, which

need not be taken into consideration; so that those ametropes who can reach the standard must be limited to hypermetropes and hypermetropic astigmatics of moderate degrees of error and with good power of accommodation. The element of age here plays an important part, as can well be understood by referring to the table of accommodative power possessed at different ages. Our regulations require that the recruit must not be less than sixteen nor more than thirty-five years of age. Minors are required to have the consent of parents, or guardians, so that the immense majority of those who pass the examination for first enlistment are between twenty-one and thirty-five years of age. Between these ages the accommodation varies from about 9.50 D at twenty-one years of age to 5.50 D at thirty-five. Now before a hypermetropic recruit can read $\frac{1}{2}$ he must bring his accommodation into play to a degree commensurate with his refractive error, in order that he may thus give to the parallel rays emanating from twenty feet the degree of convergence necessary to bring them to a focus on the retina. Suppose our recruit of twenty-one years to be hypermetropic to the extent of 3 D. Having 9.50 D of positive accommodation at his disposal he should be able, if possessed of the proper visual acuity, to overcome his refractive error and read $\frac{1}{2}$, thus passing the examination as to vision. At thirty-five years, when his accommodation would have diminished to 5.50 D, he would probably have considerable trouble in reaching the standard. If applying for *re-enlistment* at forty with an amplitude of accommodation amounting to 4.50 D, he would have still more trouble in reaching the standard, and failure would be almost certain to overtake him at forty-five years, when his power of accommodation would have fallen to 3.50 D. In hypermetropic astigmatism of both varieties, simple and compound, the action of the accommodation is essential to securing good vision at twenty feet, when such is attainable. In simple hypermetropic astigmatism one of the principal meridians is emmetropic and already adapted to parallel rays, so that only those fibres of the ciliary muscle which are required to increase the convexity of the lens to compensate for the weak refraction of the other principal meridian and intervening meridians, will be

called into play, in order, when such vision is possible, to enable the candidate to read $\frac{1}{20}$. In compound hypermetropic astigmatism there will first be necessary a general contraction of the ciliary muscle to compensate for the general hypermetropia, and then a still further contraction of certain fibres to overcome the additional hypermetropia (constituting the astigmatism) in the principal meridian of the least refraction, and in the meridians intervening between this latter and the meridian of greatest refraction. Thus it can readily be seen that the amplitude of the accommodation is of very great importance to the recruit affected with hypermetropia or hypermetropic astigmatism, who attempts to read No. 20 of Snellen's types at twenty feet. The young ametrope may pass the ordeal with flying colors, while his older comrade, with the same degree of error and the same percipient power of the retina, may fall by the wayside. Consequently it is radically wrong to assume that a recruit, between twenty-one and thirty-five years of age, who can read $\frac{1}{20}$, is by virtue of that fact *free from refractive error*. If on the other hand a candidate for re-enlistment between forty and fifty years of age, should prove his ability to do this, *we can safely assume that his refractive error is small, or that he is emmetropic*. Since a standard of visual acuity of $\frac{1}{20}$ fails to exclude ametropes, as explained above, in accepting such individuals as soldiers, when reaching this standard, we are thereby committed to the acceptance of their refractive conditions as well; and hence, in later years, cannot with justice discharge them from the service, or refuse them re-enlistment, if they fail to exhibit the required visual acuteness by reason of their refractive errors becoming manifest through failing accommodation incident to age; provided, of course, that their eyes have remained free from disease. I have in my private case books the refractive records of two hundred and five officers and enlisted men of our military service, who consulted me on account of ocular trouble. The following is the résumé of the refraction of these cases. All of these individuals were examined by me with great care, a cycloplegic having been used in most cases, and the subjective examination having been verified by ophthalmoscopy and skiascopy.

	CASES.
Hypermetropia.....	49
Myopia.....	11
Simple hypermetropic astigmatism.....	28
Compound hypermetropic astigmatism.....	40
Simple myopic astigmatism.....	4
Compound myopic astigmatism.....	16
Mixed astigmatism.....	3
Emmetropia.....	16
Anisometropia (different refraction in the two eyes).....	38
Total cases	205

The cases of anisometropia were quite varied, and were as follows:

	CASES.
Hypermetropia in one eye.....	7
Compound hypermetropic astigmatism in the other.....	7
Myopia in one eye	6
Compound myopic astigmatism in the other.....	6
Simple hypermetropic astigmatism in one eye.....	5
Mixed astigmatism in the other.....	5
Hypermetropia in one eye.....	3
Simple hypermetropic astigmatism in the other.....	3
Simple hypermetropic astigmatism in one eye.....	2
Compound myopic astigmatism in the other.....	2
Myopia in one eye.....	2
Mixed astigmatism in the other.....	2
Compound hypermetropic astigmatism in one eye.....	2
Mixed astigmatism in the other.....	2
Hypermetropia in one eye.....	2
Emmetropia in the other	2
Simple hypermetropic astigmatism in one eye.....	2
Compound hypermetropic astigmatism in the other.....	2
Myopia in one eye.....	1
Emmetropia in the other.....	1
Compound myopic astigmatism in one eye.....	1
Mixed astigmatism in the other.....	1
Hypermetropia in one eye.....	1
Mixed astigmatism in the other.....	1
Myopia in one eye.....	2
Simple hypermetropic astigmatism in the other.....	2
Emmetropia in one eye.....	1
Compound hypermetropic astigmatism in the other.....	1
Emmetropia in one eye.....	1
Compound myopic astigmatism in the other.....	1
Total cases.....	38

These cases are interesting from the fact that each individual had been selected for the service after a careful physical examination, which, if conducted according to "Army Regulations," must have included a test of the vision of each eye. Many of these cases, however, must have been examined in a very imperfect manner, especially the cases of myopia, myopic astigmatism and anisometropia; in fact, in most of these it is difficult to see how the eyes could have been tested ever so imperfectly without detection of the defect of vision. I think that any one will admit that the above array of cases proves very conclusively that our examination of the vision of recruits is not sufficient to eliminate with any degree of certainty those affected with refractive errors within certain limits. Those having marked degrees of error should be eliminated at once if care be exercised in the examination, but many hypermetropes and astigmatics of the hypermetropic type can easily reach the standard required, if examined at an age when the amplitude of accommodation is sufficient to enable them to master their refractive errors to a degree compatible with distinct distant vision. If our standard of $\frac{20}{15}$ would exclude all but emmetropes, we could with confidence expect all of our soldiers, of whatever age, to see clearly at a distance, when free from ocular disease. But since young ametropes of the types previously mentioned can easily pass this test when possessed of a high degree of visual acuity, we must expect many of our older soldiers (*i.e.*, men of several enlistments) to show a marked decrease in naked-eye visual acuity for distance, as well as for near. The reason for this need not be repeated here. Correct the refraction of these men with properly adjusted lenses, and their vision will be as good as ever. Great demands are made upon the visual acuity of our soldiers by the present system of target practice. The ametropes mentioned above are just the individuals who drive company commanders frantic on the range. Their officers cannot understand why, having once been good shots, they should after a time begin to deteriorate as marksmen, and grow worse and worse on the target range year by year. Company commanders are prone to besiege the surgeon of their respective posts to discharge such men for defective vision, claiming that they cannot see well enough to hit the target except by accident. If the

surgeon, approached upon this subject in any individual case, is not posted upon refraction, he may, after examining the man in question according to the rules for the examination of recruits, come to the same opinion, and discharge the man; thereby doing him an injustice and, at the same time, causing the service to lose a valuable soldier. If such a man is free from ocular disease, as determined by the ophthalmoscope and by oblique illumination, and if he reached the standard of $\frac{2}{3}$ at his entrance examination, the examiner can be sure that his present poor vision is due to refractive error, which has become manifest through failing accommodation incident to age. Correct this man's error with proper lenses, and he will see the bull's-eye as well as ever and will again prove himself a good marksman if his eyes alone have been at fault. The objection may be raised against this alternative, that it would look unmilitary to see enlisted men wearing spectacles while performing a military duty. We surely cannot claim to be more "military" than the English or German services, in both of which armies the use of spectacles is permitted at target practice. *For every man discharged for defective vision due solely to refractive error, the service loses a trained soldier without cause.* In our examination for re-enlistment, therefore, make the visual requirement $\frac{2}{3}$ in each eye, with optical correction if necessary, and we shall be acting in accordance with the teachings of ophthalmological science, and shall still have the best seeing army in the world.

I do not think our present standard of $\frac{2}{3}$ for the entrance examination too high. It should be rigidly required, however, in every case; and such slip-shod examinations, as I have become cognizant of in my experience, should not be tolerated. Every post should be furnished with a more liberal supply of test charts, and every medical officer who examines a man for enlistment or re-enlistment, should be required to use them properly.

II. VISUAL STANDARD IN TIME OF WAR. During hostilities we could not afford to assume too high a standard, and thus deplete our fighting strength uselessly. At such times it would be ill-advised to exclude from our service all men not possessing a naked-eye visual acuity of $\frac{2}{3}$ in each eye. A soldier with a vision of $\frac{1}{6}$ in his right eye, even if his left eye

should possess a much lower degree of sight, might be fully competent to observe the enemy's advancing line of battle, and to aim and fire his piece with tolerable precision. Of course, in battle men cannot be expected to fire with the accuracy demanded upon the target range; fire discipline has not reached that point in any army, and never will. Hence our soldier of $\frac{1}{4}0$ vision may be as liable to kill or disable his quota of the enemy as may the sharp-sighted comrade at his side. While this may be true of the line of battle, there are other duties required of a soldier in time of war which would demand the possession of a higher degree of visual acuity than that just mentioned, as, for instance, out-post and picket duty, and scouting. Taking all of these facts into consideration, I propose the following standard for war.

1. Naked-eye vision in the right eye should not fall below $\frac{1}{4}0$, and the visual acuity of this eye, after correction of existing refractive error, should reach $\frac{2}{3}0$, at least.
2. In case a naked-eye vision of $\frac{1}{4}0$ in the right eye is due to other than refractive causes, reject.
3. With the possession of the above visual power in the right eye, a naked-eye vision of $\frac{2}{3}0$ in the left eye, capable, with correction, of reaching $\frac{4}{5}0$, should permit of enlistment; provided there be no organic disease present, which latter must be determined in each case by ophthalmoscopic examination.

As far as the National Guard is concerned, in time of peace no regular standard of vision is necessary. Being recruited as a rule from an intelligent class, members of the "Guard" affected with refractive error of any consequence will, in the immense majority of cases, wear their proper correction. In time of war, however, when the National Guard will form the bulk of our fighting strength, this branch of our soldiery should be required to attain the visual standard proposed above.

ON THE APPLICATION OF SOME RECENT ADVANCES
IN ANTHROPOLOGY TO THE PHYSICAL
EXAMINATION OF RECRUITS.

By MAJOR PHILIP F. HARVEY, Surgeon, U. S. Army.

Many attempts have been made at different periods of man's history to formulate a scientific method of reading human character from physical peculiarities. For instance, chiromancy was practiced throughout antiquity, and was regarded by Aristotle as an exact science. During the middle ages various modes of divination were practiced by observation of the hand and its parts, and this art was studied like alchemy and astrology by such philosophers as Roger Bacon and Paracelsus. Later the outward marks or features of the countenance were used as a basis of interpreting character. Lavater maintained that it was possible and easy to read the disposition of any one from an attentive perusal of the countenance; he advanced as his major premise that the powers and faculties of the mind have representative signs in the solid marks of the face. A much more popular system soon after this attained ascendancy and gained many followers. I refer to phrenology, founded by Gall, which professes to find in the outward configuration of the skull an index of the faculties of the mind.

Thus we see the hand, the face and the skull have each in turn been appealed to and relied upon to furnish a key wherewith to unlock the secret chambers of human character. But when Science demanded demonstrative proof of these claims she found in each case that the superstructure was too large for the foundation. It is perhaps needless to say that the hand does not furnish

data from which unerring conclusions can be drawn; that the outcome of the study of the physiognomy depends largely upon the skill of the observer, and that phrenology is partly based upon a denial or exclusion of some of the ascertained facts of physiology.

Within a comparatively recent period however, a science which includes all the above and much more, and purports to connect physical conformation with moral and intellectual traits, has assumed an importance and definiteness that have placed it among the recognized sciences. I refer to the modern science of criminal anthropology, which stands upon a firm basis and has an extensive range especially important in the departments of neurology and forensic medicine. It has been worked out in much detail, but it is still evolutionary, and patient labor and research are still required to give it the full influence upon human affairs that it is undoubtedly destined to exert.

Our knowledge of mental pathology has likewise, within the past few years, undergone an extension of limits, and we see with clearer vision now the boundaries between intellectual health and disease.

The regulations governing the medical inspection of men who apply to enter the military service are silent upon the methods to employ in, or the necessity of recognizing the marks of degeneration in their physical conformation, and upon the signs that indicate the milder forms of insanity. Insanity, it is true, is mentioned as a disqualification, but it needs must be present in its flagrant manifestations, so that even a layman could recognize it. To me it seems that there are conditions of impaired reason less pronounced, quite recognizable by certain physical characteristics, which should guide us in our actions as medical officers in guarding the service from entrance into it of improper persons.

Obviously, in presenting a paper of this kind upon such an occasion, there is no expectation nor intention of accomplishing any other object than to call attention to the matter, and to advocate its rational employment in the limited field under our immediate control. The dream of the reformation of the age by argument, or presentation of scientific data, is a pleasing vision, but nothing more. Men will act their assigned rolls whether for good or for evil, but slightly influenced by the discoveries of science or the

admonitions of philosophers. We can leave to the modifying tendencies of time the evils of the age, resting assured that they will be reformed sooner or later by the natural forces ever busily at work. It is sufficient for us, as supervisors of the physical and mental health of the army and navy, if we apply the knowledge for their betterment, that comes to us from all sources.

There is a natural desire to prevent the entrance into the service of a thief, a drunkard or vicious person of any description. In the army, as a precautionary measure to this end, a man is required to furnish references as to his moral fitness. Now undoubtedly it is not difficult for undesirable men to procure such references. But there are certain "brand marks," the so-called stigmata of degeneracy, indelibly stamped upon the anatomy of every man with the decided taint of insanity or crime in his nature, that he cannot alter to suit the occasion. In them we may, I think, more certainly read his character, and find a more infallible guide for reaching a correct judgment than by relying upon the testimony of men who may be conscientious, but mistaken. Or at least by considering them in connection with the present scheme of physical examination we will increase the chances of definitely determining the qualifications of the person examined for the military service.

It is unnecessary here to enter into a systematic review of the recent extraordinary progress made in the study of the anatomical peculiarities that indicate degeneracy in the human family. A few of the details will answer our purpose and serve to show the principal points to which attention should be directed to aid in estimating the character of a recruit. In presenting these data little more than an aphoristic summary can be attempted. The researches of European authors are our chief sources of information, since the science is but little indebted to original observation in this country.

The word degeneration as used by anthropologists signifies the state of having become worse than one's kind, and degeneracy in the individual is a departure from the average standard of human rectitude and implies an instability of character. Maudsley defines degeneration as a change from a higher to a lower kind—that is to say, from a more complex to a less complex organization.

It is a process of dissolution, the opposite to that of involution, which is pre-essential to evolution. The course of events pursued in this pathological process is thus represented by Maudsley:—

In the first generation we perhaps observe only a predominance of the nervous temperament, irritability, a tendency to cerebral congestion, with passionate and violent outbreaks; in the second generation there is an aggravation of the morbid tendencies displaying itself in cerebral hemorrhages, idiopathic affections of the brain, and in the appearance of such neuroses as epilepsy, hysteria and hypochondria; in the third generation, if no check has been opposed to its downward course, we meet with instinctive tendencies of a bad nature, exhibiting themselves in eccentric, disorderly and dangerous acts, and with attacks of some forms of mental derangement; and finally in the fourth generation, matters going from bad to worse, we meet with deaf-mutism, imbecility, idiocy and sterility, the terminus of the pathological decline being reached. Such is the course of degeneration when it proceeds unchecked. But an opposite course of regeneration of the family by happy marriages, wise education and a prudent course of life is possible, etc.*

Atavism (from *atavus*, a great-grandfather's grandfather) is not synonymous with degeneration, but means a reversion through heredity, after several generations, to ancestral characters, and has a botanical as well as a zoological application.

In pronounced instances of mental imbecility or other mental incapacity the fact doubtless manifests itself *per se* to the observing and experienced examiner, and a study of stigmata may be unnecessary; but in cases involving simple moral imperfection the marks of degeneracy, short of a prolonged observation of the individual, probably furnish the only criteria upon which to base a judgment approaching accuracy.

We find that all parts of the body may present peculiarities of conformation indicative of lowered mental or moral powers, but the head and face have perhaps claimed the greatest share of study, and yielded the most successful results. In brief the principal stigmata of degeneracy are as follows:—

*Responsibility in Mental Disease. Page 279.

The average size of the heads of criminals is about the same as that of normal heads, but the cephalic indices are exaggerated in the former. Many varieties, about thirty I believe, of abnormal heads are described by authors. It is only necessary to speak here of the most exaggerated. Doctor Penta believes that one-third of all thoroughly bad men have plagioccephalic or twisted shaped skulls. Oxycephalism, *i. e.* a head with a prominent base supporting an inclined pyramid more or less truncated like a sugar loaf, denotes, according to Lauvergne, an alliance of the most eminent faculties of man's genius with irresistible impulses to rape, murder and theft. Lack of symmetry, one side being larger than its fellow, if easily noticeable, is just ground for suspecting moral deficiency in its owner. Enlargement of orbital arches and receding foreheads likewise tell of impaired mental faculties. These are peculiarities which the medical officer should observe.

Tripler's Manual as revised by Greenleaf for Recruiting Officers, in enumerating the causes, connected with the head, for rejection, says:

"HEAD. Deep and abrupt depressions in skull, especially if covered with scar. Any disease of the scalp. Monstrosity in size, and considerable deformities, the consequence of fracture."

It would be well doubtless to add the shapes now known to accompany vicious propensities.

The ears, in which modern anthropologists finds so many anomalies, in the manual are dismissed as follows:

"THE EARS. Tumors or growths in the meatus. Discharge of matter. Deafness in either ear."

It is believed by eminent anthropologists that the anomalies of the ear furnish the most convenient, if not the most unerring guide, to the character of the individual. The ear and brain appear to be correlated, abnormal shapes of the one accompanying faulty organization of the other. Ottolonghi says that 80% of criminals have abnormal shaped ears, and he observes that the large variety (excessive development) denote a murderous propensity, and the small (arrested development), a thievish disposition. Prominent outstanding ears, like those of the chim-

panzee, and small closely set ears, like those of the gorilla, alike mark degeneration.

The normal ear, obtained by measurement of a large number of ears of normal persons, as described by Frigerio, is about 2 to $2\frac{1}{2}$ inches in length by 1 to $1\frac{1}{2}$ inches in width. All parts should be well developed and in harmony. The anomalies that mark degeneracy are to be found in the helix, especially its root, and the antihelix, the distinctness of Darwin's tubercle, the size, the angle which the pinna forms with the temporal bone, and the size, shape and mode of attachment of the lobule.

The helix is abnormal if it lacks its inverted roll, or if its root extends across the concha, or if it is conspicuously marked with Darwin's tubercle; the antihelix if over or underdeveloped, the scleroid fossa if too large or double. The lobule is an important guide; when adherent down to its tip, constituting the so-called jug-handled or Morel ear, or when too bulky or too pendulous, it marks degeneration.

It is an observation made by most physicians that members of the criminal class bear pain and sickness uncomplainingly, and recover rapidly from surgical operations. In this they are said to resemble the lower animals. Their eyes are frequently close-set, like those of the ape, their lips and eyelids are thick; they early acquire a pale countenance and wrinkles.

"The born criminal" says Lombroso in *L'Uomo Delinquente*, "has projecting ears, thick hair, a thin beard, projecting frontal eminences, large jaws, square and projecting chin, high cheek bones, and frequent gesticulation. He is in short a type resembling the Mongolian or sometimes the negroid."

And Maudsley twenty years earlier bore witness much to the same effect, as follows:

"All persons who have made criminals their study, recognize a distinct criminal class of beings, who herd together in our large cities in thieves' quarters, giving themselves up to intemperance, rioting in debauchery, without regard to marriage ties or the bars of consanguinity, and propagating a criminal population of degenerate beings. For it is furthermore a matter of observation that this criminal class constitutes a morbid or degenerate variety of mankind, marked by peculiar low physical and mental character-

istics. They are, as has been said, as distinctly marked off from the honest and well-bred operatives as black-faced sheep are from other breeds, so that an experienced detective or prison official could pick them out from any promiscuous assembly at church or market. Their family likeness betrays them as follows 'by the hand of nature marked, quoted and signed to do a deed of shame.' "

In my observations I have noticed that the bad men of the service very frequently display the stigmata of degeneracy. A few days prior to writing this sentence I examined a deserter from the 21st Infantry. I quote from a private memorandum made at that time:—His ears stand out at nearly right angles; has a ridge in the centre of the hard palate (*the torus palatinus*), and his face is characteristic. In other instances I have found well marked stigmata on troublesome soldiers. I recall one instance of a man of fine physique, but with a degenerate head, who was accepted by myself before my attention was called to this matter, and who a year after had to be sent to the insane asylum. The application of the precautions recommended by this paper would have avoided that trouble.

Peculiarities of the nose, of the malar and inferior maxillary bones, the relative length and shape of the fingers, the length of the arms and of the femur, improper position of the great toe, abnormal disposition of the delicate concentric lines formed on the thumb and finger tips by the papillary layer of the derma, and other anatomical anomalies are also features set down by the authorities as furnishing evidences of moral or intellectual imperfections in those presenting them. But not to further enlarge upon this very interesting subject, I am quite convinced that it has now reached a stage when its principles can be advantageously applied to the recruiting service. That this suggestion has hitherto been made I do not know, but it seems a natural one. Of course it is not claimed by conservative men that the stigmata of degeneracy are always infallible, and in attempting to apply them practically we should be on our guard to draw unfavorable inferences or conclusions only concerning those individuals in whom they are very well marked, or sufficiently numerous to leave no doubt as to their meaning.

Among the *higher* degenerates abnormal manifestations are

mostly of a neurotic nature, such as psycho-sexual disorders, hysteria, dipsomania, defiance of social usages. In these we likewise observe similar anatomical stigmata that characterize degenerates of a lower plane. The possession of superior mental organization differentiates these decadents from the criminal class. They may give evidence of mental ability of a high order, and perform work which assigns them a niche in the temple of fame. Indeed, to this class have belonged some of the most brilliant geniuses of the world, and its members have both shed lustre and brought misfortune upon the military service.

Slowly and with unequal pace science has led the way to clearer and ever clearer conceptions of the mental functions. The old theological and non-scientific idea that there is a soul situated somewhere in the brain that is superior to and independent of the chemico-vital processes going on in the cellular elements around it, is responsible to a great extent for the relatively slow advance made towards a proper comprehension of insanity, and to-day it impedes a rational conception of mental phenomena among the laity more than any other cause. And to an extent greater than it should the same feeling deters the educated and professional man from dealing broadly with questions involving the intellect. Science and gratuitous assumption are not compatible,—much less so science and superstition.

There is a delicacy felt concerning the placing of restraints around the suspicious paranoiac or melancholic, which too often culminates in the commission of a world-horrifying crime with its multiplication of grim and far reaching effects. And this disinclination is more pronounced when one in authority is the object of suspicion, and there is no doubt that it then becomes a more difficult matter to deal with, but it is one that should be attacked fearlessly, but cautiously, as any other problem involving the interest of humanity requiring solution.

Not long since accounts were printed of the harsh methods of discipline of a certain athletic major of the Prussian army. If a soldier deviated the fraction of an inch from the exact military interval in dressing with his company, the major rushed forward and kicked the ill-starred private violently upon the shins. This he varied by felling a man or two every day at drill with his fists if

he did not think the soldier comprehended rapidly enough. Not long afterwards this officer developed symptoms of violent and unmistakable insanity.

The accident to the English battleship Victoria in the Mediterranean during naval manoeuvres on a calm day and under a clear sky, with its attendant appalling loss of life has raised a conjecture that Admiral Tryon who gave the fatal order, may have been insane at the time. The possibility of an individual vested with absolute authority to order large bodies of men into situations involving their certain destruction being tainted with a fatal lack of mental equilibrium is ever present, as nothing is so cunning and elusive as insanity.

Among the leaders of the world we find innumerable instances of mental alienation. It is the part of insanity to brook no interference, and to invest an idea with supreme importance that dwarfs all others; to be an enthusiast or a radical in some special field. Saul, Nebuchadnezzar, Ajax, Orestes, Heliogabalus, Nero, Swedenborg etc., are cases which might be multiplied in whom different forms of insanity were exemplified.

In the military service the form of insanity most frequently met with is that known as dementia paralytica, so much so that it has been referred to as "military insanity." Mickle in his exhaustive monograph (p. 254) says, "military and naval life favor the production of general paralysis." He found the proportion of lunatics in the English army and navy to be larger than in any other order of persons. He says:—"In soldiers there are several factors; among the officers, the tension of anxious responsibility; among all grades the violent emotions and privations of warfare; the shock of artillery discharge; the bursting of shells; but especially alcoholic and sexual excesses and venereal diseases. General paralysis was rife among the veterans of the first Napoleon."

The tendency to paresis is less pronounced in our service during these times of peace than shown by the above picture, but the disease is frequently met with, and other forms of insanity present themselves from time to time, such as paranoia, mania, monomania and melancholia, affecting alike the commissioned officer and the enlisted soldier. It is in the highest degree desirable to exclude from the service officers or men who

labor under or are inclined to any form of mental aberration. How far this may be done by the use of modern anthropometric and anthropologic data, in conjunction with present methods, I am not prepared to say; but I entertain a growing conviction that these data have attained an importance which justifies their use, and that will sooner or later enforce their recognition and adoption.

At the recruiting rendezvous the medical examiner is never afforded the opportunity of analyzing the symptoms of mental alienation obtained from a systematic study of intellectual and emotional disturbances. The usual mode of making a diagnosis enjoyed by the alienist is denied the medical officer, and he must reach his conclusion by the exercise of the closest observation of external signs joined with that nice sense of discrimination obtained by experience and tact. That an accurate conclusion will always be practicable is rendered impossible by the existence of forms of insanity that present no discoverable organic lesion to the most careful examination, either before or after death.

Still, external evidences found in cranial conformation and facial expression, if carefully and intelligently interpreted, will in most instances enable the medical examiner to reach a decision best adapted to meet the interests of the service. It is during times of peace that the greatest care should be exercised to detect the congenital criminal, the neurotic degenerate and the social Ishmaelite, as barrack life is most favorable to their deleterious influence upon others. In time of war the increased demand for troops, the enlarged powers of commanders for disciplinary control, the dangers and excitement of battle and other obvious considerations render greater latitude in accepting recruits permissible. The foregoing remarks are applicable to the National Guard as well as to the regular service, for instances of infractions of discipline growing out of the presence of a degenerate or insane person in a company, either of State or U. S. Troops may doubtless be recalled by many medical officers of this association. In concluding this hasty and imperfect sketch, it may not be amiss to explain that I have proposed no systematic scheme for using the data herein mentioned in the examination of persons desirous of entering the service, for the reason that we already have in the Bertillon system of minute anthropometric measurements and Her-

schell's finger-print system, excellent methods that embrace the essential points I have referred to, and to which any desirable features can be added that experience may render desirable. It goes without saying that we should tolerate no fanciful or haphazard scheme, but take only the data which the most exact observations of biological science has given us.

DETERMINATION OF THE PERSONAL IDENTITY OF THE UNITED STATES SOLDIER.

By MAJOR PAUL R. BROWN, Surgeon, United States Army.

In the armies of all civilized nations, various descriptive data, such as height, color of the eyes and hair, tattoo-marks etc., have always been recorded to a greater or less extent at the time of a recruit's entrance into the service, with a view of establishing his personal identity at some future time, should it be necessary.

With the exception of France, no nation has yet adopted any thoroughly scientific system for the identification of its soldiers. There can be no question as to the utility of any system which can be depended upon to establish the personal identity of soldiers composing an army, and had such a system been in operation in the armies of the U. S. during the civil war, bounty jumping, which at one time almost threatened the integrity of the Army of the Potomac, would so readily have been detected that it would soon have ceased to be a source of danger.

The officers of the Pension Bureau have often had great difficulty in establishing the personal identity of applicants for pension, and there have even been some instances of one man drawing two pensions under different names, and many cases in which the name of a deceased soldier has been assumed for the purpose of defrauding the government. Even now, the air is filled with rumors of war, and it is not impossible that thousands of the citizens of this nation may be compelled to march forth for the defense of their country. The honest, patriotic soldier certainly will not object in the slightest to any method or system capable of establishing his identity under any and all circumstances, whether as dead

upon the field of honor or when, after the throes of the bloody contest are over, diseased or maimed he is an applicant for pension.

Skulkers and bounty jumpers would undoubtedly most seriously object to any system of identification. For any system to be effective, first of all it is essential that its results be capable of rapid and easy classification for future reference, also that its practical application be not beyond the capabilities of the average individual. In the United States Army a method of identification is now employed which, for want of a better name, may be called the "Outline Card System," and which consists of the careful notation of all scars, marks etc., found upon the body of a recruit, upon outlines of the human figure printed on a card.

Its greatest defect is lack of classification, as it is practically impossible to make a scientific classification of scars and marks. Quite a number of fraudulent enlistments have been detected since its introduction into the army, and on this account it has received undue credit. With the method of description previously employed in the army, it was purely accidental if any fraudulent enlistments were ever detected. A comparison of the old and the new system would of course demonstrate the vast superiority of the outline card system, but unfortunately this comparison would have to be made with what was virtually no system at all.

The system now in use answers fairly well, as far as it goes, but at the best, it can never be more than moderately effective, as its results do not admit of scientific classification, and on this account in time of war when the armies of the republic would be greatly increased, it would be worse than useless. I will not take up your time with regard to it any farther than to say that the classification of the outline card system is practically a classification of the *principal* scars and marks presented by a recruit at the time of his enlistment, with the addition of his height. The only truly scientific, effective and practical system of identification yet discovered, is that now employed in the French army, and known as the "Bertillon System of Anthropometric Identification." In France, more than twelve millions of anthropometric descriptive cards are now on file in the records of the Department of War.

Quetelet, the illustrious Belgian scientist, first demonstrated the

fact, that mathematical laws determine the distribution of the forms and dimensions of living things. The frequency with which a form or dimension occurs progressively diminishes as it is removed from the mean, and this decrease is in almost exact concordance with a simple mathematical formula, Sir Isaac Newton's binomial theorem, the law of the coefficients of the binomial in its development.

If we go into a forest of oak trees of all ages and sizes, what an infinite variety do we see not only of heights but also of forms. But if we examine into the subject a little more closely, if we classify these trees according to their ages, an entirely different aspect of affairs appears. There still will be differences in height and form, but between the tallest and the shortest trees, all the others will be grouped in accordance with the law previously mentioned. The trees of average height will form much the most numerous group, but in proportion as the various trees are removed from this average height, the number will become smaller and smaller, until at the extreme limits there will only be a few exceptional individuals. This numerical decrease is not simply a matter of hypothesis, but it can be mathematically calculated independently of all observation.

The number of trees in the forest, whether giants or dwarfs, is determined according to a law as fixed as that which regulates the symmetrical development and arrangement of their leaves. As far as man is concerned, the mean of form or dimension may vary greatly from one race to another, but the mean once found, there will be no farther difficulty. For instance, so far as the height is concerned, in each country the oscillations will be about a mean greater or smaller which will be determined by the influence of race and climate, by differences in the plentifullness of the food supply etc.

Thus the Laplander will be shorter than the Patagonian etc. In every race the heights are grouped about the mean as if they had been distributed by a supreme hand. As all the forms and dimensions of man oscillate or vary between a maximum and a minimum, necessarily the forms and dimensions intermediate between these extremes will form much the largest number of cases; hence the necessity, if we desire to have our classes

approximately equal, of three grand divisions—the small, the medium and the great.

The terms describing these divisions of forms and dimensions may greatly vary, but the dominant idea will always be the same. The Bertillon system of anthropometric identification is simply a practical application of the great scientific truths discovered by Quetelet, and but for this philosopher there would have been no so-called Bertillon system. Although in several foreign countries the Bertillon system is employed for the identification of criminals, in many other ways the determination of the personal identity of an individual may be advantageous to society in general. Wherever and whenever the proof of a person's identity is necessary to secure his interests, the interests of his associates or those of the state, the Bertillon system is capable of rendering us valuable service. If we wish to determine the identity of the victim of a railway accident; of a soldier killed in battle; in all cases where the body has been destroyed to such an extent as to be unrecognizable by any of the ordinary methods of identification, the Bertillon system is of very great assistance. Were this system in general use, a dead body at the morgue, a man attacked by paralysis on the street and unable to give his name and address; a lunatic running amuck on public the highways etc., could readily be identified and there would be no danger of having those nearest and dearest to us consigned to the oblivion of the Potter's Field. Hundreds of applications of this system, entirely distinct from criminal identification, will suggest themselves to any one familiar with its principle.

The Bertillon system consists of three distinct parts: first, the measurement of certain bony lengths; second, a systematic analysis of the features of the face; third, the exact anatomical localization of the various scars, marks, congenital or acquired, upon the body of the subject examined. It having been conclusively demonstrated that after twenty-one years of age, the various bony lengths of the human body are practically unchangeable throughout life, Bertillon has selected certain of these lengths which vary greatly from one individual to another, and which admit of easy measurement and of still easier classification. These lengths are as follows: the antero-posterior and transverse diameters of the

head; the bi-zygomatic diameter; the middle finger length; the length of the foot; the cubit or distance from the point of the elbow to middle finger; the stretch or distance between the extremities of the middle fingers when the arms are extended crossways from the body; the height proper; the height of the subject when seated and the length of the little finger. To these various measurements are added the length of the ear—an organ which is virtually unalterable during adult life. The measurements of the head, middle finger, foot and cubit, which are capable of being taken with more exactness than the others, may be termed the grand classification measurements.

The instruments employed are a head caliper and two measures which somewhat resemble those employed by shoemakers. They are inexpensive, and in an hour's time any school-boy of average intelligence can be taught their modus operandi. After these various measurements come a systematic analysis and classification of the features of the face in accordance with the same grand principle stated above; the oscillation of all forms and dimensions between a maximum and a minimum.

The results of these analyses are termed descriptive data. An analysis of the profile or outline of the bridge and base of the nose will be a good illustration of these analyses. The profile of the bridge of the nose may be rectilinear (the mean), convex or concave (the extremes), and the qualifying term sinuous or undulating, if necessary, may be applied to each one of the above forms. Thus a nose would be noted as convex-sinuous, in which the general profile of the bridge was convex and also somewhat undulating. The base of the nose may be horizontal (the mean), elevated or depressed (the two extremes). Thus it will be seen that a nose with convex, rectilinear or concave bridge may be elevated, horizontal or depressed so far as its base is concerned. By the use of the parenthesis and underlining, we can modify each of the above qualificatives. For instance, employing these characters, the series of concave nose bridges could be arranged as follows: (concave), concave, concave. The word concave within a parenthesis would signify a nose bridge but *slightly* concave; the word concave without parenthesis or underlining would

be interpreted as *middling* concave and concave underlined as *markedly* concave.

It thus is evident that the outline of the bridge of the nose may be the subject of seven qualificatives as follows: *convex*, convex, (convex), rectilinear, (concave), concave, *concave*. This form of seriation may also be applied to any feature of the face. In the Bertillon system the eyes are classified according to the amount of orange-yellow pigmentation presented by the iris; the scale extending from the pale blue eyes of the blonde races of the Scandinavian Peninsula to the maroon or very dark brown eyes of the inhabitants of the Dark Continent.

There are seven classes in all, each with nine subdivisions, which are indicated on a chromo-lithographic chart. Certain data are also noted in regard to the coloration of the complexion, which may be pigmentary or sanguineous or a combination of both. Pigmentary coloration takes into consideration the amount of pigment or coloring matter in the skin; sanguineous coloration, the amount of blood circulating through the skin which its transparency enables us to perceive. Thus, with a florid Englishman, the sanguineous coloration would be great and the pigmentary coloration slight, whilst with a pale, dark Italian, the sanguineous coloration would be slight and pigmentary coloration great. The third and last part of the Bertillon system consists in the exact localization and registration of the scars, marks, deformities, etc. of the subject under examination. Certain anatomical points, termed guiding points, are employed to determine their location. For instance, for the chest, the nipples and the fork or notch between the collar bones are used as guiding points, and for the abdomen, the navel. The imaginary line called the median line is also a means of localization. For example, a tattoo-mark of a heart transfixied by a dagger located upon the breast of a subject would be thus described: pierced heart three by two centimeters, four centimeters under right nipple and five centimeters from median line.

As regards the time required for making the various measurements, descriptive analyses and anatomical localizations, Bertillon himself says "That with two individuals, one measuring, examining and dictating, and the other recording, the time employed is

usually seven minutes." The question may now be asked whether an individual of average ability can readily learn and put into practice this method, which at first sight may seem somewhat complicated and obscure.

If the directions of Bertillon are faithfully carried out, the average soldier can readily take all the measurements required after an hour's instruction. The classification of the results obtained will next demand our attention. Its classification is what renders the Bertillon system so vastly superior to every system of identification which has as yet been proposed. Certain measurements above mentioned have been termed the five grand classification measurements; viz: length of head, breadth of head, length of middle finger, length of foot and length of cubit. Following out the dominant idea of the system, a head length may be small, medium or great and the other measurements may be qualified with the same terms. In the central office at Paris there are two large cases, one designed for the alphabetical classification of the descriptive cards; the other for their anthropometric classification. Duplicate cards are made out for each subject examined. One of these cards is classified alphabetically and the other anthropometrically according to the grand classification measurements previously mentioned.

The anthropometric case is divided horizontally into three equal sized compartments for lengths of head, and vertically into three other divisions for breadth of head, and farther subdivided for the three classes of middle finger lengths, foot and cubit lengths. The descriptive cards are filled in lidless sliding boxes, upon the front of which are pasted paper slips with the Roman numerals I to V inclusive printed upon them.

Let us suppose, for example, that the War Department of the United States has adopted the Bertillon system, and that all recruits entering the service are measured and examined in accordance with the rules of this system, and that their descriptive cards have been forwarded to Washington and there filed alphabetically. Whenever a soldier deserts or is dishonorably discharged, the Surgeon General's Office will at once be informed of the fact, and the deserter's descriptive card will then be taken from the alphabetical files and classified anthropometrically in

accordance with the five grand classification measurements. Now let it be supposed that our hypothetical deserter has enlisted under some other name, and we wish to ascertain this fact. As the new descriptive cards are received at the central office, they are compared with those already on file in the anthropometric collection, which is supposed to be a collection of descriptive cards of deserters and dishonorably discharged soldiers. Let us farther suppose that this anthropometric collection contains 150,000 cards and that we wish to ascertain whether a descriptive card just received has its counterpart in this collection. We read on this card that the subject's head length is 187 millimeters. As the medium class of head lengths extend from 185 to 190 millimeters, both numbers inclusive, we at once put him in the medium class of head lengths and thus eliminate 100,000 cards from our collection.

We note that the head breadth recorded on the card is small, and following out the same principle, we eliminate two-thirds of the remaining 50,000 cards, leaving still remaining 16,666 in the collection. The same method of elimination is then pursued with the length of the middle finger and by this measurement we reduce the number of cards in our collection to 5,555. Again eliminating by the length of the foot we make a farther reduction to 1,850, which number is still farther reduced by the cubit measurement to a group of about 600. Elimination by means of the height reduces this last number to 200 cards, which is again subdivided, always following out the same plan, by the bi-zygomatic measurement, the length of the little finger, the length of the ear, the height and stretch until we obtain a group of about a dozen cards which are arranged according to the color classes of the iris. After the various measurements have disclosed the location of the sought for card, a comparison of its descriptive data and its record of the position of the various scars, marks etc., with those of the card just received absolutely demonstrate that one and the same individual is the original of both cards. We are thus enabled to assert without the shadow of a doubt that a duplicate of the card just received is or is not on file in the anthropometric collection, and are also able to decide as to the fact of the desertion, dishonorable discharge etc. In Bertillon's work upon Anthropometric Identification, an English translation of which will shortly appear

in this country, full directions will be found in regard to the manipulation of the various anthropometric instruments, its peculiarly excellent plates rendering it almost impossible for the most stupid individual to misunderstand them.

Full information will also be there found in regard to the correct manner of analyzing and observing the various features of the face, the registration of descriptive data and the notation of the anatomical position of scars, marks, deformities etc. The question may now be asked as to the cost of the anthropometric outfit: the whole outfit, including Bertillon's work, can be procured in Paris for a little less than fifteen dollars. In addition there will be required, for convenience in mensuration, a plain wooden trestle table and a small bench, both of which can be constructed by any carpenter at a cost not exceeding five dollars.

At the central offices two cases will be necessary for the alphabetical and anthropometric classification of the identification cards. It is neither necessary nor advisable that the Bertillon system in toto should be introduced into the United States Army. The eleven measurements: head length and breadth, length of middle finger, length of little finger, length of foot, cubit, height, stretch, trunk, bi-zygomatic diameter and length of ear are absolutely essential. Certain descriptive data taking into consideration the entire profile of the face; inclination of forehead and chin; description of the outline of bridge and base of nose and also some other data in regard to the color of the iris; color of hair and beard; sanguineous and pigmentary coloration of the complexion should be noted in every case. The ordinary data usually recorded on enlistment papers, such as name, age, nativity, occupation, arm of service, date and place of enlistment are first entered on the proposed identification card.

Next come the anthropometric data proper, followed by the descriptive data and date, name and station of the examining officer. The reverse side of the identification card is devoted to a description of the various scars, marks congenital or acquired etc. of the individual to whom the card pertains, and also their anatomical location determined in regard to certain guiding points. Their registration is made in the following order, this order being

indicated by the Roman numerals from I to VIII, both numbers inclusive.

I—Left Upper Extremity; II—Right Upper Extremity; III—Face and Front of Head and Neck; IV—Chest and Abdomen; V—Back and Back of Head and Neck; VI—Left Lower Extremity; VII—Right Lower Extremity; VIII—Distinguishing Peculiarities of Gesture, of Walk, Mannerisms etc. By the use of certain abbreviations, the time employed in the registration of the scars, marks etc. may be very much lessened. I now exhibit for your inspection the anthropometric instruments proper, and also a proposed identification card for use in the United States Army and National Guard.

PHYSIOLOGY OF BATHING AND SWIMMING.

BY LIEUTENANT HENRY G. BEYER, Surgeon, U. S. Navy.

Water, where used in the form of baths, affects the human body chiefly in two ways, namely: through its mass, and through the temperature which it carries. As regards the human body itself we may, furthermore, speak of a direct and an indirect action of water. Whenever water is employed merely for purposes of personal cleanliness, it is for its direct effect on those tissues with which it is brought in contact. When, however, one wishes to employ this fluid to influence remote parts—those with which it cannot be brought into immediate contact—then it is its indirect influence, exerted through the nervous system, that must be called into play. While both these different effects must more or less overlap one another, and can, in practice, be scarcely separated, it is well always to keep this physiological distinction in mind.

The study and investigation of the physiological effects of water can scarcely be said to have received much serious attention. Nearly all that is known of its physiological and its therapeutic effects is due to Wilhelm Winternitz and his pupils, whose unshaken and lifelong faith in its efficacy merits at least admiration. It would seem almost superfluous to state that a knowledge of the normal or physiological action of water of different temperatures, and of its different forms, is essential to its intelligent employment, since in the case of all newly adopted or discovered therapeutic agencies an investigation into physiological properties is generally the first thing demanded.

Experiments have shown that different tissues of the body react differently toward water of different degrees of temperature: thus, connective tissue expands under the influence of hot and contracts

under that of cold water, while elastic tissue, on the other hand, reacts like soft rubber—that is to say, it can be made to contract by hot and to expand by cold water. In the case of the human skin, the elastic-tissue elements seem to prevail within temperature limits ranging from 32° to 145° F.

When it is remembered that 98.6° F. is the temperature which is maintained by man, with little variation, in all climates, so long as he is in a normal condition of health, this degree may be called his *temperature optimum*. All the chemical processes and all the physiological functions that are essential to life must be best performed at this temperature, and the function of a most complicated heat-regulating mechanism is in constant requisition to maintain it. Consequently, water which has an exclusively direct and merely local effect on the body and its functions must be of a temperature that does not in the least interfere with either heat-production or heat-radiation; this temperature may perhaps vary within certain limits, for the average individual is probably superficially a few degrees below 98.6° and may be said to be of the temperature of a water which feels neither warm nor cold to him.

When one recalls the fact that remote tissues and the deeper organs must naturally be affected by bodily contact with a water of either higher or lower temperature than that just mentioned, and when, furthermore, it is realized that this effect must be the greater the larger the temperature difference is, he begins to appreciate that water may become a most powerful factor for good or evil, according to its application, which should always be governed by a knowledge of its normal physiological properties.

It has also been experimentally demonstrated that, during bathing, an electrical current passes from the warm to the cold medium; that is to say, in a bath which feels cold there is a descending electrical current, and in one which feels warm there is an ascending current. The strength of these currents, as can be readily imagined, must vary in direct proportion to the temperature difference existing between the body and the water surrounding the same. And these currents, thus called into existence, must either weaken or strengthen the normal nerve-currents which are constantly present in the living, active body; thus, the

normal efferent motor current is directly strengthened by a cold bath, hence the inclination, when in a cold bath, to make rapid muscular movements; and in such a bath, for similar reasons, the normal nerve-current in afferent nerves must be weakened. Another observation of some importance in this connection is that a certain amount of swelling by absorption takes place whenever the body is kept in contact with water for a length of time. Now, a calming effect is said to be produced whenever this swelling by contact is greater than the electrical current is strong; an exciting effect, on the other hand, is produced whenever the electrical current preponderates.

The prompt disappearance of the itching sensation about the skin, whether normal or diseased, and of the feeling of general fatigue when the body is subjected to the influence of a hot bath, is explained by the swelling which takes place in the peripheral termination of the nerves of general sensation.

The existence of special endings of temperature nerves in the human skin having been conclusively demonstrated not only by physiological experiments but by clinical and pathological observation, it is probable that it is through these that the greater portion of the reflex effects due to water are produced. In any event, every known fact so far ascertained seems to point to the nervous system as being the channel through which water of varying degrees of temperature affects the normal functions of the body in bathing. The refreshing and restorative qualities of a cold douche after having taken a certain amount of exercise are well known, and all are equally well acquainted with the power of a few drops of cold water thrown into the face of one seized with syncope. It must be kept in mind also that the normal excitability of nerve-endings in the skin may be increased or diminished by contact with water of different degrees of temperature, for experiments made with the esthesiometer of Sieveking have proved that hot water will increase and cold water diminish excitability to a great degree, even to the production of complete anesthesia.

Besides these local effects on the nerve-endings and their functions, we must take into account the reflex effects produced upon the motor and inhibitory nerves. Contraction of both voluntary and involuntary muscles can be induced reflexly by the applica-

tion of cold water; moderate chilling will invariably induce contraction of the capillaries and smaller arteries and veins, while moderately hot or warm water will cause their dilatation, thus plainly evidencing a reflex influence upon the vaso-motor portion of the sympathetic nervous system.

The great vascular dilatation that follows upon a merely temporary contraction induced by very cold water is an example of stimulation of the inhibitory and the vaso-dilator nerves by this means; and all have no doubt observed sad cases in which a temporary blanching of the surface of the skin was immediately followed by hyperemia succeeded by stasis and congestion.

That we have here to deal with reflex phenomena is still further proven by the fact that the contraction of the capillaries and of the smaller arteries and veins is not confined to the spot where the application of cold is made, but is observed also at remote points. If, for example, a sphygmograph be applied to the radial artery at the wrist, and a normal tracing taken, and then a piece of ice or a quantity of cold water be applied to the elbow, contraction of the radial vessel will be found to have taken place when the next pulse-tracing is recorded; and this reflex contraction of the vessels may be carried to such an extent as to cause complete occlusion of vessels, and consequently lead to the complete arrest of the circulation over the affected area. This simple physiological fact would go far toward explaining a number of little mishaps that occur every summer during the bathing season. The temporary loss of memory or even of consciousness that sometimes supervenes during swimming or bathing, can only be explained by temporary arrest of circulation in certain areas of the brain, due to reflex contraction of the blood-capillaries caused by the too prolonged influence of cold. It has been experimentally shown by Magendie and Valentin, that whenever the lumina of certain vessels are diminished, less blood flows through those vessels in a given time, even if, for the time being, the heart's action should be increased.

My personal interest in bathing was aroused through the intimate and practical relation which it bears to active exercise. It is well known how profoundly circulation and respiration are influenced by the latter, and that the majority of those who pursue ex-

ercise of almost any kind systematically, with a certain fixed purpose in view, also take their baths with great regularity, satisfaction, and enjoyment; thus the question very frequently arises as to which is the best form of bath to take after this or that form of exercise. To the conscientious medical adviser it is a matter of some embarrassment to be obliged to confess ignorance in many cases. On the one hand, very little physiological work has been done with the view of ascertaining the effects of exercise; and on the other, the profession is but imperfectly acquainted with the results produced by bathing: both are prescribed and taken empirically, and both, therefore, often do a deal of harm instead of being productive of good. Both exercise and bathing being capable of the greatest possible amount of variation, according to conditions, the exact influence of either upon the tissues and their functions should be thoroughly understood before one begins the study of their mutual relation. Circulation and respiration being more especially influenced and concerned in the taking of exercise, as well as in bathing, a sphygmographic investigation, while in itself it can never prove exhaustive, ought to go far in revealing many of the problems involved; and to present some of the results obtained from an investigation of this character, is the object of this paper.

Figures 1, 2, 3, 4 and 5 exhibit tracings obtained from several young men in perfect health, and taken with the express view of showing the effects a certain amount of exercise has on the pulse; these were taken by means of a Dudgeon's sphygmograph applied to the radial artery at the wrist. The exercise taken, in each instance after the normal tracing had been made, consisted in doing the various strength tests prescribed or required by the anthropometric chart in use in gymnasias,—these various tests, providing one does his best, call into play all the muscles of the trunk and limbs to their utmost capacity of strength, if not up to the point of fatigue. While, therefore, the actual amount of work done in each individual case, and expressed in kilogrammeters of work, must differ with the personal capacity, it amounts, nevertheless, to the best efforts of the subject and ought, consequently, to affect all alike, or as nearly alike as could be expected, provid-

ing the circulation is normal and the anatomy of the heart and blood-vessels perfect.

Figures 1 and 2 represent typical pulse-tracings and show the influence of exercise in a most striking and unmistakable manner. A, in all the figures, exhibits the normal, or a tracing taken before exercise, while B represents tracings made immediately after exercise. As an immediate consequence of the exercise it

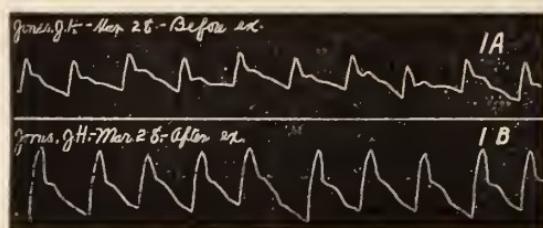


FIG. 1.

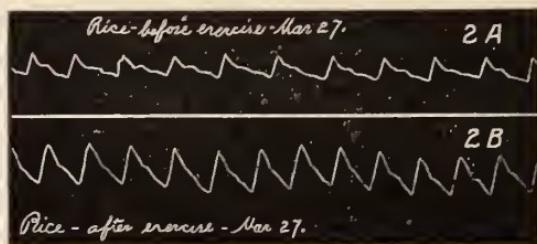


FIG. 2.

is found, first, that the pulse-rate is quickened; second, that the up-stroke is considerably lengthened; third, that the elastic after-vibrations in the line of descent of the tracing are almost completely abolished—in other words, that the lines have become much straighter; and fourth, that the entire pulse-tracing looks much more voluminous than under normal conditions. This collection of characteristics seems to admit of but one interpretation, namely: it points to a dilated condition of the vessels and a consequent lowering of arterial blood-pressure. The blood-vessel walls are relaxed, and more blood flows through the affected area than under normal conditions, even if the vessels themselves are not completely filled, as they naturally would be under the normal or a higher pressure.

Figures 3, 4 and 5, while showing the same general characteristics when tracings A and B are compared with each other, also exhibit certain additional points which are worthy of consideration. It is found, in Figures 3 and 4 more especially, that in the normal pulse-tracing A the dicrotic wave in the line of descent is unusually prominent, so as to give the entire pulse-tracing in some parts

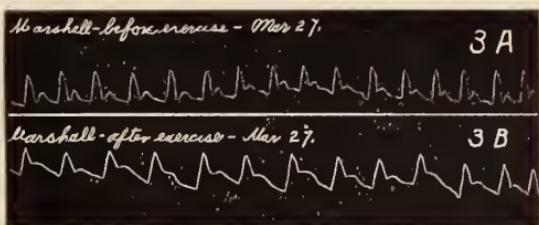


FIG. 3.

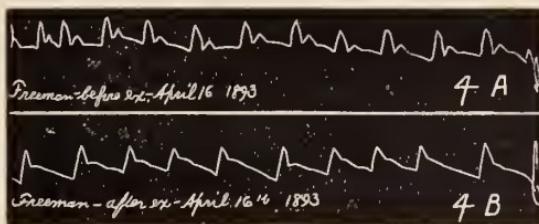


FIG. 4.

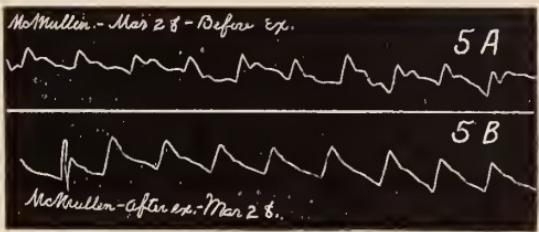


FIG. 5.

an almost completely dicrotic character. Now, a dicrotic pulse is found in mitral insufficiency; in typhoid fever during the third week; as the result of a steam bath; and sometimes as the result of a sudden and extreme muscular effort—in all these instances it signifies a lowered arterial pressure. Since no mitral insufficiency could be detected in either of the two cases from which the tracings represented by Figures 3 and 4 were obtained, the only explanation

of the character of the normal pulse-tracing must be, either a naturally weak condition of the muscular walls of the heart and blood-vessels, or some temporary nervous influence.

It is known that the dicrotic character of the pulse of typhoid fever, as well as that produced by the hot bath, can be made to approach the normal again by the simple administration of a moderately cold bath. It is, furthermore, a matter of frequent observation, in cases of mitral insufficiency (as was first shown by Oertel), that the dicrotic pulse assumes normal characteristics during muscular exercise such, for example, as is involved in a gradual and slow ascent of a mountain. A dicrotic pulse due to sudden muscular effort may be restored to the normal by a cold bath. In all these instances of restored normal movement we find a muscular element in constant play: in one case the muscular tone is increased by the administration of a cold bath, in the other by a gentle systematic form of exercise. It is unnecessary to dwell further on the fundamental significance of these apparently simple facts.

Any one, after a careful examination of Figures 1, 2, 3, 4 and 5—showing the different effects on the circulation produced by the same exercise on different individuals—will not only see the great necessity for further investigation of this subject, but must begin to appreciate, as never before, the desirability of a high-grade medical supervision in the administration of gymnastic exercises to both young and old.

Having now considered the more striking features of the effects produced by a certain well defined form of exercise on the circulation, so far as these can be ascertained by the simple means of a sphygmograph, let us proceed, after the same manner, and by the same means, to study those produced by water of certain stated degrees of temperature.

The two pulse-tracings, A and B of Figure 6, were obtained from a perfectly healthy, rather athletic young man, of small stature, about eighteen years of age. His normal pulse at the wrist is represented by tracing A, while B was obtained immediately after an exposure of his entire body to a needle douche of the temperature of 52° F. for a period of fifteen seconds. It will be observed that the immediate effect of the cold water in

this form on the pulse was: first, a slowing of the rate; second, quite considerable shortening of the up stroke; third, a diminished dicrotic wave; and fourth, elastic vibrations, if anything, rather increased in number and extent. All these observed characteristics indicate a strong contraction of the vessels, an increased arterial pressure, and less blood flowing through the area thus affected.

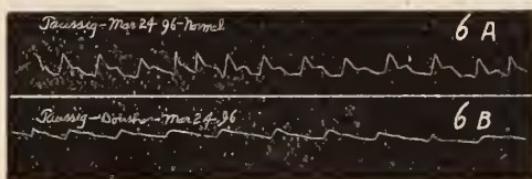


FIG. 6.

If, now, we compare the tracings A and B of Figure 6 with the corresponding tracings shown in Figure 1—which latter exhibit the immediate effects of exercise—the contrast shown to exist between the two could hardly be more striking nor more easily recognized. The two conditions thus described are not only entirely different, but—what is of still greater significance—they are of a diametrically opposite nature. Any further attempt at explanation of the conditions, so plainly shown by the simple comparison of the respective tracings in these two figures, is, consequently, superfluous. The refreshingly agreeable effect of a cold douche, taken after exercise, is thus very strikingly shown to be one (in great part at least) of the opposite effects, physiologically speaking, which either produces on the organs of circulation.

The tracings A and B in Figure 7 show a different state of things when compared with the tracings in Figure 6. These were taken from a young man of very good physique and in perfect health, aged seventeen years. A represents a perfectly normal pulse; and tracing B, taken immediately after a plunge and swim for twenty seconds in water of 45° F., shows the effects of both cold water and the exercise on the pulse. The normal pulse was changed into a dicrotic one, and its rate considerably increased; arterial pressure was lowered, the vessels incompletely filled with blood and actively dilated, through direct stimulation of the vaso-dilators by the sudden application of rather cold water to the entire

body. A mere glance at Figures 6 and 7 shows, as well as one could wish, the totally different results on the circulation produced by cold water administered in different ways. Without a close analysis and a knowledge of the physiological effects produced by both exercise and water on the circulation, an intelligent interpretation of the difference existing between the tracings B of both figures would be absolutely impossible. Thus it is plainly seen how the subject widens even when viewed from the threshold, and



FIG. 7.

the apparently simple act of administering a bath assumes a much more complicated character than was supposed. These tracings, moreover, are not mere freaks, but recur time and again, providing the conditions under which the observations are made are exactly alike. The complicated nervous mechanism involved in their production reacts with wonderful delicacy, promptness, and uniformity. In the two preceding figures the effect of water on the pulse is shown without any exercise intervening between the two observations, represented by tracings A and B respectively. Now insert a certain amount of active exercise between the normal tracing and the one taken after the bath or plunge, and see what their mutual relations are:

In Figure 8, the normal pulse-tracing A was taken from a vigorous and perfectly healthy young man, aged seventeen years; a moderately quick run of a quarter of a mile followed, in a well ventilated gymnasium and over a well constructed running-track, after which tracings B and C were immediately taken; and tracing D was obtained immediately after an exposure of the nude body to a shower and needle douche of fifteen seconds' duration, the temperature of the water registering 59° F. A shows the characters of a perfectly normal pulse, while B and C both exhibit a

marked and dicrotic phase in the pulse, and also a varying arterial pressure synchronous with the quickened respiratory movement incident to running; and in D there is a most decided approach to the normal tracing A.

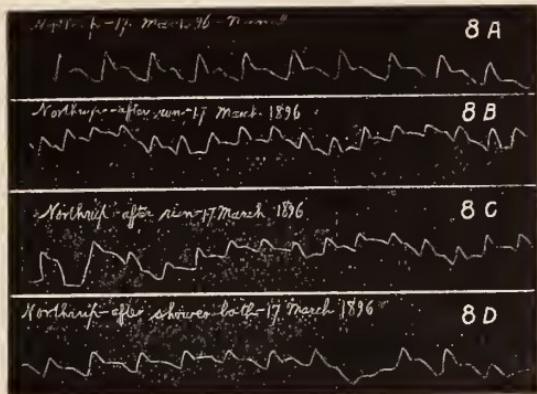


FIG. 8.

When one reflects upon the great change from the normal which the pulse underwent during this run, as shown in B and C, and its prompt restoration to the normal by exposure to a shower bath of but fifteen seconds' duration, he may perhaps gain some idea of the physiological fitness of things.

Figure 9 exhibits three tracings obtained in the same manner as the foregoing, with the important exception that a cold immersion was taken immediately after the run, instead of a shower bath, and also that the run was much slower in this case; the plunge merely amounted to a momentary immersion into a pool of water

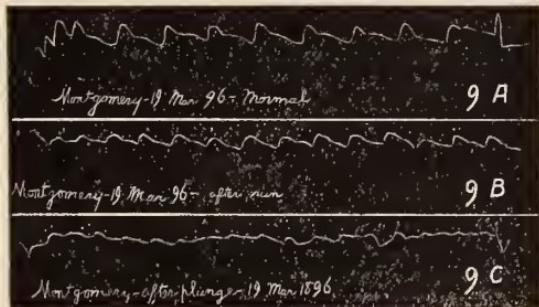


FIG. 9.

of the temperature of 45° F., no attempt at swimming being made, the object being to eliminate as much as possible the effects of the exercise and to get the first effects of the water alone. Here is an example of the powerful constricting effect which cold water exerts on the blood-vessels, shown in tracing C, otherwise also plainly indicated by the blanching of the entire skin, but no attempt on the part of the pulse to assume normal proportions.

Tracings A, B and C, of Figure 10, were obtained under conditions similar to those of Figure 9; the run, however, was rapid, and was finished in half the time. Tracing A does not fulfill the requirements of a perfectly normal or typical pulse at the wrist; but that the character of this pulse, as shown, is peculiar to the individual, is proved by the fact that repeated observations made months apart always gave the same pulse-tracings. Tracing B brings out in a still more striking manner than Figure 9 the influence of a quickened respiration on arterial pressure incident

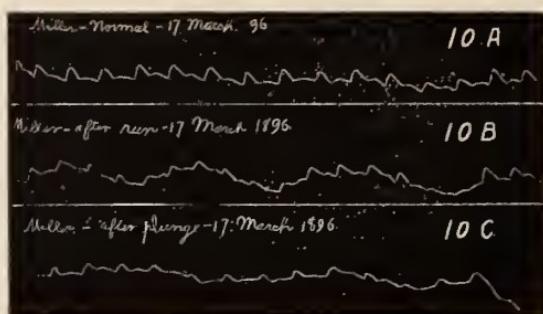


FIG. 10.

to running.—I do not remember of ever having seen these respiratory undulations more distinctly shown. In tracing C, taken after a plunge and swim of fifteen seconds' duration in water having a temperature of 52° F., is again shown the preponderating influence of the cold water without any sign of an approach on the part of the pulse to the normal.

Thus far, then, these observations would show that the administration of a shower bath after exercise would be much more in accordance with the indications and the requirements than that of a sudden plunge into cold water.

The tracings in Figures 11, 12 and 13 were all obtained from members of a swimming class. Tracing A in each represents the normal pulse, taken before swimming; B, the pulse after they had been in the water from fifteen to twenty minutes. The temperature of the water, taken fifteen minutes before the swimming began, was 82° F. and felt pleasant and agreeable to the skin. There is but little departure from the normal pulse in each case—they all show the same reduction in the volume.

Owing to very limited opportunities afforded this year of making further and more detailed observations with regard to swimming, my studies in this direction remain incomplete. But

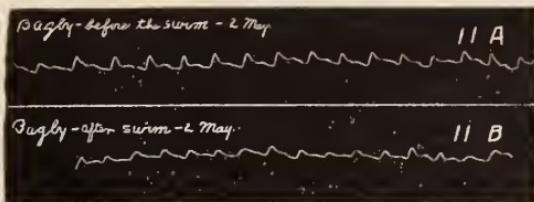


FIG. 11.

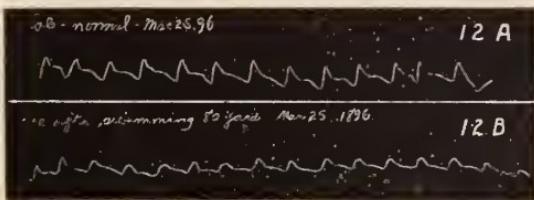


FIG. 12.

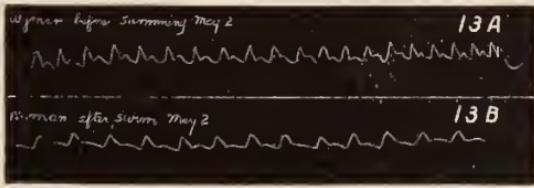


FIG. 13.

enough has been said and done not only to direct attention to the great importance of the subject, but also to point out to those more especially interested the opportunities for further research in this direction.

BATHS, BATHING AND SWIMMING FOR SOLDIERS.

BY LIEUTENANT H. LINCOLN CHASE, Assistant Surgeon, M. V. M.

"The soldier may be depended upon to do his whole duty," says Rudyard Kipling, "when he has learned to fear God, shoot straight, keep clean, and honor the State!"

The recognition of the value of personal cleanliness represents one of the greatest advances in the civilization of the present century.

Yet in the five previous conventions of our Association, so little has been said of the importance to the soldiers' health of the third commandment of the epigram just quoted, "Keep clean," that the distinguished Chairman of our Literary Committee, Assistant Surgeon-General Bache, of the Army, has especially requested two papers on bathing, one of them by Surgeon H. G. Beyer, of the Navy, the other by an humble assistant surgeon of the Massachusetts Volunteer Militia.

The need of improved bathing facilities for soldiers, namely, cleanliness baths and swimming places, the latter out-of-doors or in-doors, seems to the writer to deserve more attention from the medical officers, both of our Regular Army and National Guard. By this I do not mean to say that our army posts are without very respectable bathing facilities, nor that some of the camp grounds of our National Guard, notably Pennsylvania, New York and Massachusetts, have not some kind of bathing places. I intend to show, however, that we are still behind the times in our system of cleanliness baths for soldiers, and in facilities for teaching them and perfecting them in what Benjamin Franklin aptly termed "The necessary and life-preserving art of swimming," which he urged should be a part of the national education, since, as he said,

"Ability to swim may enable one to save his own life or the lives of others." Furthermore, swimming is the most universal, and for many persons, the most enjoyable of all healthful physical exercises.

The statistical exhibit of our great civil war shows strong reasons why a soldier should know how to swim. The total number of soldiers killed in action was 67,058, while the number lost by drowning was 4,959, Ohio alone losing 14 officers and 770 men in that way.* The majority of these men, nearly five regiments, were lost while fording streams, crossing narrow rivers, or by the upsetting of small, overcrowded boats, when a few strokes would have saved their lives.

SWIMMING IN EARLY TIMES.

Glancing backward, ancient history relates that during the régime of Solon all the boys of Greece were required by law to be taught first of all the accomplishments of swimming and reading; and later their possession became so common that when a Greek wished to describe a state of utter destitution of physical and mental training, he used to exclaim, "He can neither swim nor read!" Plato praised the art of swimming, and Aristotle wrote on bathing and swimming and the advantages of salt and fresh water respectively. No less attention was given to bathing and swimming by the ancient Romans, before and during their ascendancy. Even the women were many of them strong swimmers, especially in the early days of the republic. The Roman boys received instruction in swimming just as regularly as in riding and fencing, and usually their fathers were their teachers. The great Emperor Augustus delighted in teaching his nephew swimming, and Julius Caesar was so proficient in the art that in the Alexandrian war he saved his life and his famous "Commentaries" by swimming from a sinking ship to a place of safety, plunging his head under water from time to time to avoid the shower of arrows that followed him.

The ancient Greeks and Romans did not practice swimming for pleasure or for the benefit of their health alone, but from a motive

*Dr. J. C. Nosse.

that had its origin in one of the principles of their religion. We know that the people of antiquity dreaded above everything the being deprived of the honors of sepulture. Therefore, the fear of drowning and having no other tomb than the bottom of the sea or the bed of a river, stimulated them to practice this exercise with more perseverance than modern swimmers, who are not influenced by similar considerations. The Abbe Amilhon says, "This prejudice, which rendered men more careful of their lives, tended to the benefit of the State, in preserving to the country those valuable citizens who, when occasion required, could be of essential service."

"The exercise of swimming," adds the same learned author, "has not only preserved the lives of many persons valuable to the state, but it has enabled not a few to perform successfully heroic acts, which, had they been unable to swim well, they would never have dreamed of attempting." In illustration of his proposition he recalls the well-known story of Horatius defending the bridge leading into Rome, and suggests that he never would have had the hardihood to face the Etruscans as he did, while the bridge behind him was being demolished, without perfect confidence in his swimming powers. He was fully armed, but plunging in he swam easily, as Roman soldiers were accustomed to, in spite of the burden of his armor. Scipio Africanus, for the encouragement of his men, crossed rivers in this way, his cuirass upon his back. Sertorius, though wounded, swam across the Rhine, burdened in the same way. Such proficiency was attained only by long practice. It was the custom of the Roman soldiers, as soon as they had finished their drill on the Campus Martius to hasten to bathe in the swift waters of the River Tiber, and so refresh themselves.

But this custom, like all the other commendable customs of the Romans, came in time to be discontinued, and Vegetius, who lived during the reign of the Emperor Valentinian the Young, mourns over the decadence of an art, the utility of which, both for cavalry and infantry, he speaks of in the highest terms.

Among the barbarous hordes that invaded the Roman Empire, several are mentioned as excelling in the art of swimming, more particularly the Germans. From earliest infancy, their children were bathed regularly in the rivers once a day, and so become

hardened and able to endure the cold. Very fitting it is that the descendants of those early Germans, having returned to their old custom of daily bathing their children in cold water, should show the world of to-day the best system of cleanliness bath, and, with the English, should lead the way in promoting the healthful practices of bathing and swimming.

Let us now briefly consider the present bathing facilities of our own Regular Army, and of the British, French, Austro-Hungarian, German and Japanese armies.

WEST POINT.

Beginning with the United States Military Academy at West Point, which the writer had the pleasure of visiting in September, 1895, the cadets were found reveling in an abundance of hot and cold water, in shower and tub baths, and in a commodious, well-constructed swimming tank. Post-Surgeon Torney, and Mr. H. J. Koehler, Swordmaster and Instructor in Swimming and Gymnastics, take the liveliest interest in the hygiene and physical training of the future officers of the army. All the cadets take cleanliness baths at least twice a week, and many three times. Swimming instruction, at first in the tank and later in the Hudson, is given each cadet for six weeks every year until he is able to swim on his chest in the river, behind a boat, for at least ten minutes continuously. Afterward, practice is optional, but is usually continued from choice. About 30 per cent. of cadets, on joining, are unable to swim. The swimming tank is of the best possible material, lined throughout with English white-glazed brick. It is about 60 feet long by 30 feet wide, its depth ranging from four feet to nine feet. Shower baths are conveniently near, and are used by the cadets previous to entering the swimming tank.

The instruction is given in squads of convenient size by the instructor and two experienced enlisted men. The system taught is so excellent that the writer has obtained permission, through Instructor Koehler's courtesy, to have printed in connection with this paper, his valuable little treatise on swimming, prepared for the use of the West Point Cadets.

ANNAPOLIS.

Though the scope of this paper is limited to "Baths, Bathing and Swimming for *Soldiers*," the writer visited the United States Naval Academy at Annapolis., where Surgeon H. G. Beyer has direction of physical training, expecting there to find even better swimming facilities than those of West Point. Excepting, however, the fine plunge bath in the basement of the gymnasium, and the shower and tub baths for cleanliness purposes, the Naval Cadets do not enjoy as excellent facilities for swimming instruction as are found at West Point. The swimming tank at Annapolis was built many years ago, is of very meagre dimensions, and is not lined with suitable material. It has, however, the one redeeming feature, that it is supplied with salt water. The method of instruction is much the same as that employed at West Point.

The writer saw a squad of cadets receiving very scientific and very practical instruction from Instructor Strom, who informed him that about 25 per cent. of the cadets, on joining, are unable to swim.

THE UNITED STATES ARMY.

For the facts as to bathing and swimming at our military posts, the writer is largely indebted to Assistant Surgeon-General Alden, of the army, and to other officers of the regular service.

Paragraph 269, Army Regulations, requires frequent bathing. At some posts records are kept, so that it may be ascertained that each man has a weekly bath. Old soldiers are very cleanly in their habits, and need no compulsion as to bathing, but recruits have to be looked after. A majority of our posts, and all permanent posts, have within a few years been provided with ample facilities for keeping clean. There is usually a bath-house in each barrack. Tubs with hot and cold water are usually provided , so many for each company, and in a few cases shower baths are provided. In some places the facilities are still very primitive, and doubtless will receive more attention. The writer, in two visits to Arizona and other distant territories, where he spent several days in the saddle among the mountains of the Apache country, heard from the cowboys and Mormons great praise of the cleanliness of

the United States soldiers, both white and black troops, though the general feeling between soldiers and civilians seemed far from cordial.

As to swimming in the army, recruits are expected to receive instruction in swimming, and the manual prepared by Mr. Koehler, Instructor at West Point, is used as a guide. No swimming tanks or other special facilities for instruction exist. Swimming drill for cavalry is a part of the regular instruction. (See Paragraph 456, Cavalry Drill Regulation, pages 153 to 156.)

SOME FOREIGN ARMIES.

The facts as to bathing in the French, German, Austro-Hungarian, British and Japanese armies were obtained by the writer during two visits abroad, by correspondence, and from the meagre literature on the subject.

THE FRENCH ARMY.

In general terms we may say the bathing regulations of the French army require a shower bath for the whole body, by each man, at least once in every fifteen days, and at least once a week a bath for the feet and legs, if in barracks. On the march the foot bath is to be taken as often as necessary. No tubs are used by the regiments, as far as can be ascertained, though they were seen in use at the Military School of St. Cyr in addition to the shower baths. At none of the eighteen principal military schools are there swimming tanks, as far as can be ascertained, and comparatively little if any attention is given to swimming by any portion of the French army. Very few of the streams in France are deep enough to swim in, and in few of those that are deep enough, is swimming permitted by the inhabitants in the vicinity.

THE GERMAN ARMY.

In the magnificent German army the very best facilities for keeping clean, as well as very thorough drills in swimming, are found. Though there are no printed official regulations as to bathing, each company commander is required to make and enforce rules for the cleanliness of his men. It is the custom, throughout

the army, for every soldier to wash to the waist in cold water every morning, and to bathe his entire body, by means of a shower bath, at least once a week. No tubs are used, experiments with tub baths for soldiers having been tried in the German army and proven a failure; only basins and shower baths are now in use. The latter, sometimes called the "German rain bath" because first used in German military barracks and prisons, deserves some description.

The development of the "rain bath" system, which gives one a good bath quickly and comfortably—important requisites of a public bath—has tended to the abolition of the bath-tub, and till rather recently has been almost unknown in America, though now being extensively introduced here in many places. In this system tubs are abolished and a fine shower of warm water is substituted, which is made to fall at an inclined angle, the object being to avoid a vertical stream striking the head of the bather, an annoyance objected to by many. In the rain bath the bather stands erect under the shower and the water strikes the body from the neck downwards, the head only being wet when purposely placed under the shower. In the floor, which should be of granolithic or other impervious material, there should be a sinkage of a few inches in the middle, thus forming a basin for the feet, the part hardest to get clean. A short vertical pipe in a corner of the sinkage serves as plug and overflow.

Among the advantages of this system are a great saving in time, so a given number of baths will accommodate a greater number of bathers. It also economizes water and fuel, the shower consuming but three to five gallons of warm water per minute, while the tub bath takes from 40 to 60 gallons. The body of the bather does not come in contact with soiled water or surfaces, a very obvious advantage. Last, but not least, the tonic and mechanical effects of the shower bath are greatly superior to the tub bath.

The first general use of the rain bath was, as stated, by the German army. From the military service the rain bath was introduced for public baths in Berlin, Vienna, Munich, Hanover, and in fact most of the other cities of Germany and Austria. Rain baths have also been provided for schools in Göttingen,

Munich and Weimar, and are used almost daily by 75 per cent. of the pupils. Rain baths have also been fitted up in a great many factories and manufacturing establishments. Comparatively recently, rain baths have been introduced into the United States, and are to be found in New York, Utica and a few other places. They are now being introduced in the public bath in Brookline, Mass., and elsewhere.

Besides attention to cleanliness, the German army makes every effort to encourage and perfect its officers and men in swimming, and this is true of every branch of the service, but especially in the cavalry, in which there is a regular swimming drill for both men and horses, to which great importance is attached. Whenever possible each regiment or garrison has a swimming tank, and there are also many out-of-door swimming places, for example, in the Rhine. Very thorough instruction is given both to army and to navy cadets, and a high standard has to be attained. The enlisted men receive instruction regimentally. In each regiment an officer, assisted by several non-commissioned officers, is detailed in charge of the swimming school. There are no regulations as to the methods to be employed, the officer in charge using his discretion in each particular case. The traditional standard to be attained by a German soldier is ability to swim across the Rhine in uniform and full equipments.

Some years ago Colonel Von Dresky introduced for his command a preliminary land drill in swimming, a special method devised by Major D'Argy of the French army, and before Von Dresky's time experimented with in the Seventh Brandenburg Infantry by Captain Von Wins. This method, also in use at West Point, makes the acquirement of the art safer, easier and quicker than is otherwise possible. Von Dresky used a combination of the D'Argy with the Pfuel or usual Prussian method when he taught Prince William, the present Kaiser, and Prince Henry, his brother, to swim. The fact that Prince Henry, in full-dress uniform, once plunged from the quarter deck of a "man o' war" and rescued a drowning sailor, not the prince's first rescue, either, speaks eloquently for the success of his instructor, and the prince's courage in water.

THE AUSTRO-HUNGARIAN ARMY.

Taking next the Austro-Hungarian army, which endeavors to follow, as far as possible, German military methods, we find less attention is given to cleanliness than in some other armies, but in the matter of swimming it does very well. It is the custom for local commanding officers to provide bath-rooms, or bathing places, doing their best with the means at hand. The frequency of bathing seems to rest with the officers, and when in contact with a body of Austrian soldiers, if the truth must be told, one's sense of smell establishes the fact that washing is not always carried to extravagant lengths. Some posts, however, have adequate bathing facilities, consisting of the rain baths just described.

The following are the only official regulations as to bathing and swimming:

In summer, when the weather is favorable, the men shall be taken to bathe at least once a week. Individual soldiers may bathe or swim only at bath-houses or at places that have been officially approved.

Out of regard for men who cannot swim, the bathing place is to be carefully sounded, and the danger limits clearly marked. Beyond these limits, they are not allowed to go.

When one or two of the companies go to bathe, an officer will have charge of them. When a smaller detachment bathes, a non-commissioned officer will be in charge. When several battalions bathe at the same time, a medical officer must be present, and an officer of each battalion.

Swimming instructions are to be given during the summer at those stations where the local conditions permit a large participation and favorable results without interfering with military training, and is then to be prosecuted zealously.

It is the duty of the local commanding officers at such stations to see that the greatest possible number of their men are educated to become skillful swimmers.

Decency and propriety are to be observed, and both officers and bathers are to see that the latter do not go into the water while heated.

The local commanding officer is charged with finding out or preparing bathing places, and also, when practicable, with fixing up swimming schools. He designates when the different organizations shall use them, and, where possible, orders a medical officer to be on hand. At cavalry stations, where it is possible to give both men and horses swimming drill the necessary steps for the purpose will be taken.

In all the cadet schools and military academies swimming is obligatory, but is taught only in summer, and pretty much under the conditions mentioned in the regulations quoted above. Swimming, like every other athletic exercise, counts as much as mathematics or any other study in determining class rank and the resulting army rank. The standard attained will depend much on the opportunities available; but where the opportunities are excellent, a boy would have to become at least a fair swimmer in order to graduate.

The land drill of D'Argy is a regular part of the system, and Austria possesses some very fine military swimming schools, notably the one in Vienna.

THE BRITISH ARMY.

In the British Army, in summer, "bathing parades," as they are termed, are held twice a week. In almost every barrack, iron bath tubs are provided, and a plentiful supply of cold water is turned on. In winter these baths are not generally used. To encourage the habit of cleanliness, however, it is the custom in cold weather to supply a quantity of hot water from the barrack kitchens for bathing purposes.

In India, the West Indies and, indeed, all hot countries, ample provision for bathing is made. The shower bath, however, is not yet introduced, except in military hospitals.

In the military and naval academies, swimming is part of the gymnastic course. About 5 per cent of the cadets on joining them, as against 25 per cent. and 30 per cent. with us, are unable to swim. They are all well taught, however, before leaving, one of the cadet company officers superintending the final test. Cadets are also taught diving, which gives great confidence. The lowest standard allowed is the ability to swim 300 feet.

At the Military Academy at Woolwich, a swimming bath, 90 feet long, with water heated to 60° to 70° Fahrenheit, has been provided, while at Sandhurst the cadets utilize a lake for swimming and boating, but no cadet is permitted to enter a boat until he has gained a swimming certificate.

The following provisions with regard to swimming for soldiers, are given in the Queen's Regulations:

BATHING PARADES.

The art of swimming is to be taught as a military duty at all stations where facilities for so doing exist. During the proper season regular bathing parades are to be formed, at the discretion of commanding officers, for the purpose of instruction in swimming.

The skilled swimmers of each company, etc., are to be ascertained, and so distributed that there may be a sufficient number in each squad to teach the rest.

PREVENTION OF ACCIDENTS.

In order to prevent accidents and loss of life among the troops through incautious bathing on the part of soldiers unable to swim, small piquets, composed of expert swimmers, are to be told off to attend the bathing places frequented by the troops, to be prepared to jump in to the assistance of any man in danger, and in the event of accident, to follow, to the best of their ability, the "Instructions for the Recovery of the Apparently Drowned," printed by the Royal National Lifeboat Institution. A copy of these instructions will be posted up at the several bathing-places, as well as in every hospital and barrack. Should an accident occur, one man of the piquet is to be immediately despatched to the nearest medical officer.

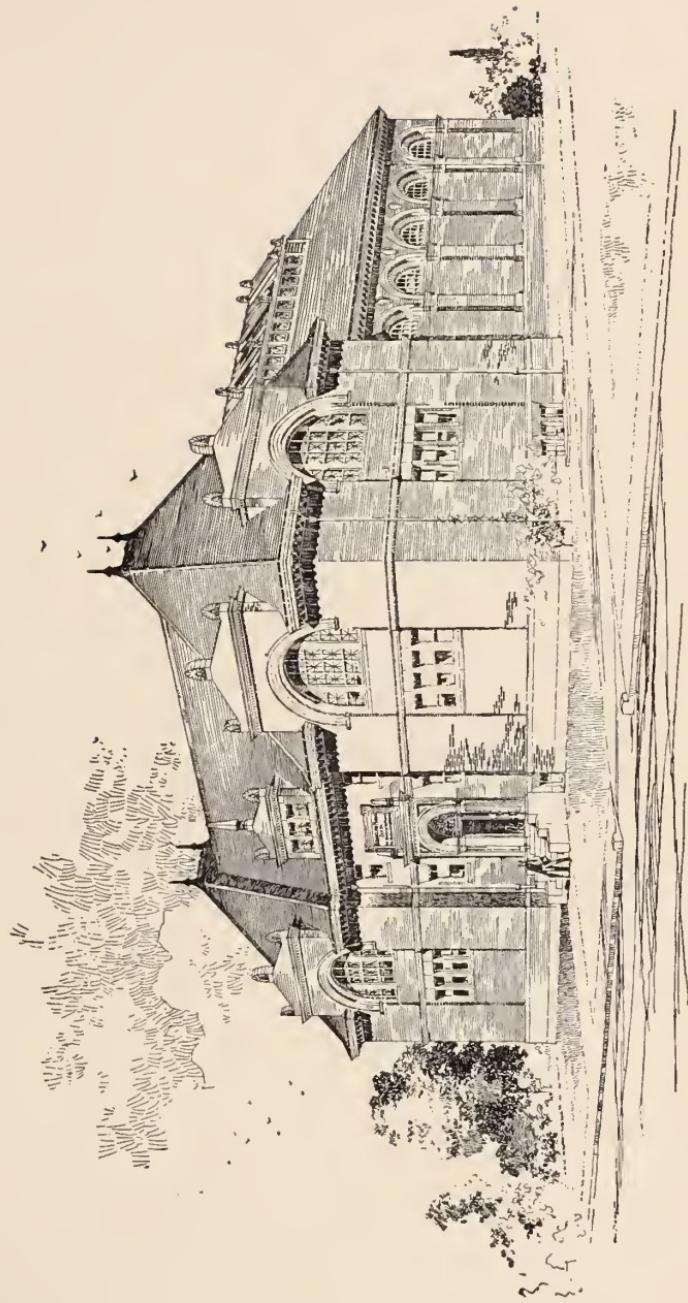
LISTS OF SWIMMERS.

A list of swimmers is to be kept in each company, and with a view to ascertain the progress made by the troops, periodical trials, under the superintendence of an officer, are to be made of men who have learned to swim, when the names of men who have acquired the art, should be added to the list.

To swim easily is the only standard required of enlisted men.

In India, large swimming baths exist in all the lines in nearly every cantonment. In the West Indies and in the Mediterranean Stations, the men bathe in the sea all the year round, and to their great advantage.

Swimming is in every way greatly encouraged, by example as well as by command: to illustrate, the writer has heard from a most reliable officer of a captain in the West Indies swimming his whole company round a "man-of-war" at anchor, sharks notwithstanding!



THE BROOKLINE PUBLIC BATH.



THE SWIMMING TANK.

THE JAPANESE ARMY.

For the facts as to the Japanese army the writer is indebted to Viscount Ishiguro, Surgeon-General, and to Dr. Stuart Eldridge, of the U. S. Marine-Hospital Service, stationed in Yokahama.

Japanese soldiers are required to bathe daily in summer and three times weekly in winter, tubs being used.

All recruits are taught swimming, which is encouraged throughout the army by providing excellent schools in the nearest rivers and in the sea. Specially expert teachers are employed, and the standard for military and naval cadets, as well as for the rank and file, is the ability to swim one or two miles.

MODEL MILITARY BATHING ESTABLISHMENT.

Having now very imperfectly described the present status of "Baths, Bathing and Swimming for Soldiers," the writer will attempt to carry out the second part of Colonel Bache's suggestion, namely, to furnish a general plan and estimate of cost for suitable bathing establishments for our large military posts. All present here are probably aware that in the near future our regular troops will be concentrated, as now in England, in a comparatively small number of very large posts.

His request was made because the writer happens to have the honor of being selected as Chairman of the Special Committee on Improved Public Bathing Facilities in Brookline, Massachusetts, a progressive residential town of some 17,000 inhabitants, and adjoining Boston, but having no water front. Since the Brookline public bath, in the writer's opinion, is a model (with one slight exception as to its arrangement) of what an all-the-year-round military bath should be, a brief description is given. The result of the Committee's labors is a handsome T-shaped brick building, now being constructed, which is to contain a number of rain baths of the German "Gegenstrom" pattern (with space for more in the future); three bath tubs for those who cannot or will not see the advantages of the slant shower bath; a swimming tank, 80 by 26 feet, lined with English white-glazed brick; a small tank 22 by 10 feet, same material; some fifty dressing-rooms; a gallery for spectators, also serving for a running track;

a small steam laundry for the towels and tights; toilet-rooms, and meeting or lecture rooms. A special feature found in two of the best and most recently completed bathing establishments of Europe (Stuttgart and Hamburg) will be the addition of a passageway in the rear of the dressing-rooms that surround the two swimming tanks, as well as in the front of them. This addition has the hearty approval of Dr. E. M. Hartwell, Director of Physical Training of the Boston Public Schools, and has obvious advantages, not only in convenience, but in keeping clean the passageway around the swimming tanks and consequently the water, a most important point, while also securing better ventilation for the dressing-rooms and better order among the bathers.

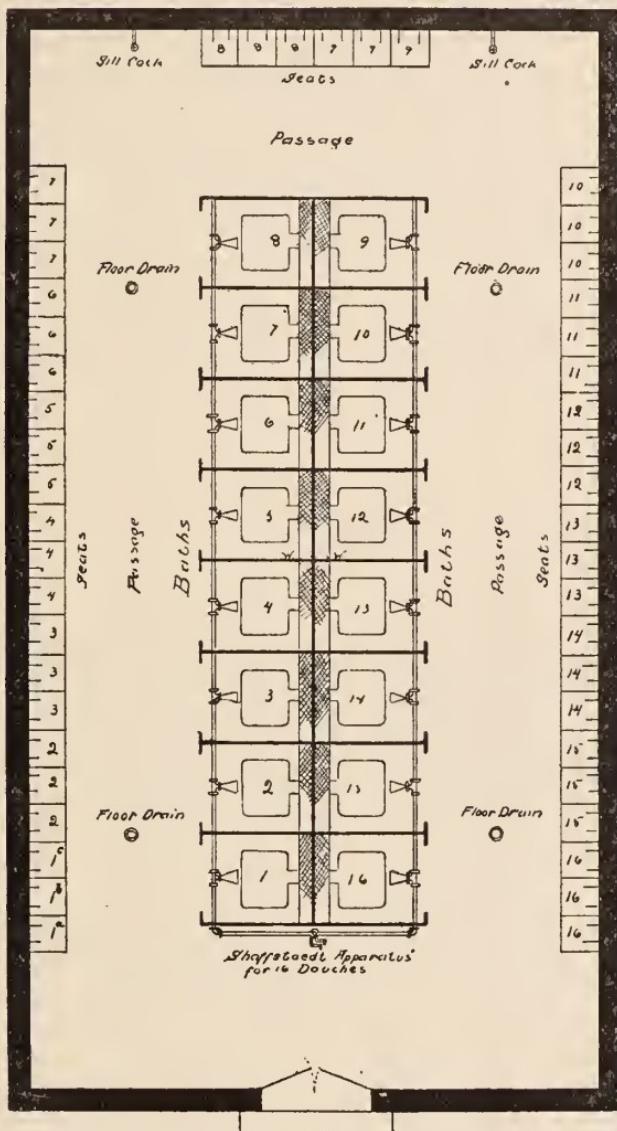
The water constantly changing, is from driven wells, and is heated by steam, the temperature being equalized and sustained by a pulsonometer, and the surface of the water being constantly swept by a superficial current of fresh water from one end of the tank.

The shower baths in a military bathing establishment would better be arranged as in plan on p. 299, prepared for the writer by Mr. F. Joseph Untersee, architect, of Boston and Brookline. Mr. Untersee, who served in the German army as a one-year volunteer, prepared the plans accepted for the public bath in Brookline, just described.

The cost of the Brookline public bath, exclusive of land, will be \$40,000, and the cost of the maintenance is estimated at \$4,500 to \$5,000 per annum. Such bathing establishments as this, but of a somewhat smaller size, the writer would recommend be erected at some few large U. S. military posts of the future that have no water front, and to which recruits are most likely to be sent for their preliminary training. It is also recommended, that at all posts having water fronts, swimming places be secured, as is done in Germany and elsewhere.

As to bathing and swimming in our National Guard, some facilities for bathing are usually provided during encampment, and in most organizations there is some knowledge of swimming, but few men are proficient.

In the regiment to which the writer has the honor to be at present attached, the Fifth Infantry, Colonel William A. Ban-



PLAN OF SHOWER BATHS FOR A MILITARY BATHING ESTABLISHMENT.

croft commanding, about 15 per cent. of officers and men are unable to swim at all.

In closing it is gratifying to be able to state that the head of the Medical Department of the Massachusetts Volunteer Militia, Surgeon-General Edward J. Forster,² like his distinguished predecessor, Surgeon-General H. L. Burrell, who began the good work, has taken the necessary steps to secure better bathing facilities at the State Camp, including facilities for instruction and practice of the troops in swimming. He advocates a large artificial pond, suggested by Adjutant-General Samuel Dalton, for swimming practice, which, with the present facilities, will better enable the troops to exemplify the proverb of the great Wesley, that "Cleanliness is next to godliness."

APPENDIX.

The following excellent treatise on Swimming, by Mr. H. J. Koehler, Swordmaster and Instructor in Swimming and Gymnastics at the U. S. Military Academy at West Point, has been published by command of Major-General Nelson A. Miles, for the information and assistance of the officers of the Department of the East, U. S. Army, in teaching their commands swimming and kindred subjects, and a copy of it is furnished to each new cadet.

RULES TO BE OBSERVED.

1. Squads attending swimming should not be marched in such a manner that they arrive at the swimming place *overheated*.
2. After arriving at least 15 minutes should be allowed for undressing.
3. The clothing must not be removed hurriedly, but leisurely, so that when fully undressed the temperature of the body be nearly normal.
4. Only as many as can be instructed at one time should leave the dressing-rooms. Those who are not immediately to be employed should wear a portion of their clothing.
5. Standing in the water to cool off or entering it gradually

² Died May 15, 1896.

should be prohibited. If the temperature of the body be normal the whole body should be submerged at once.

6. While in the water the body should be kept in motion constantly; by this means a good circulation is maintained and chills are avoided.

7. When the first sign of a chill manifests itself the man must leave the water at *once*.

8. Beginners should be kept in the water not longer than ten minutes. Gradually as he progresses and becomes accustomed to the water this may be lengthened to fifteen or twenty minutes.

9. When out of the water he must dry and dress himself at once.

10. Fear on part of a beginner cannot be overcome by promises of punishment or sarcastic remarks. Appealing to his manliness will generally prove successful. Lack of confidence in himself is overcome in a like manner.

PRELIMINARY EXERCISES ON LAND.

ARM MOVEMENTS.

The men to be instructed will form in the single rank, with an interval of about $2\frac{1}{2}$ yards.

The instructor commands:

1. Trunk forward, 2. *Bend*, 3. Arms forward, 4. *Raise*.

At the command *bend*, the body is bent forward in such a manner that it is at right angles to the legs.

At the command *raise*, the arms are brought horizontally to the front, elbows straight, palms of hands together, fingers closed; the head is well thrown back.

1. Arm movements, 2. *One*, 3. *Two*, 4. *Three*.

At the command *one* the hands are turned palms downward, and the arms, stiffly extended, are moved outward until the hands are in a line with the head; the arms are now bent and drawn toward the body until the hands are closed directly under the chin, the forearms are well pressed down and the upper arms are parallel to the sides of the body.

At *two* extend the arms directly to the front, keeping the hands together.

At *three* pause. To recover, command *Attention!* The first of these is a slow movement and the second is a short and quick one.

LEG MOVEMENTS.

1. Leg movements, 2. Right leg, 3. *One*, 4. *Two*, 5. *Three*.

At *one* the right knee is raised as high as possible.

At *two* it is extended sideward.

At *three* it is brought against the left. Repeat same with left leg.

The instructor will explain the stroke when executed with both arms and legs.

This may also be executed on land. The men standing with hands closed overhead, arms straight, will at the command *one*, turn the palms forward and lower the arms sideward until the hands are in a line with the head, while the arms are being bent and the hands are about to be closed under the chin, the knees are well bent. At *two* the knees are extended with a slight hop and the feet are parted, at the same time the arms are extended upward. At *three* the legs are closed with a hop.

APPLIANCES.

BELTS.

These are about three inches wide. Made of canvas, padded on the inside with hair and bound and faced with some soft material. On the canvas side there are three three-quarter inch iron rings securely sewed to the belt; at each end of the belt there is a larger iron ring, $1\frac{1}{2}$ inches in diameter, also securely fastened.

ROPEs.

Quarter-inch ropes of some soft but strong material should be used. For beginners 15 feet, and for those who are qualifying 30 feet should be used.

UPRIGHTS.

About two feet from the edge of the water an upright should be placed. This should be eight feet high and have an arm which projects over the water five feet long. On the end of this arm a pulley, to receive the belt rope, should be fastened.

ADJUSTING THE BELT.

The belt is slipped on over the head and held well up under the arms. The instructor draws the first turn of the rope, then the second and finally the third. The knot or last turn must be exactly between the shoulder blades.

PRELIMINARY EXERCISES IN THE WATER.

The belt being adjusted the man will prepare to leap into the water; he will draw a deep breath, and at the command *Leap!* he will spring from the platform. The body must be kept straight

and the feet strike water first. The mouth must be kept closed and the air retained as long as possible. After reaching the surface, in which he is assisted by the instructor, he will take the following position.

POSITION IN THE WATER.

The body, with the chest down, is fully extended; arms are held horizontally forward, just under the surface of the water, palms together, fingers closed; the legs are straight and closed, feet downward; head thrown back. When the position is correctly taken the instructor commands:

1. Arm movements, 2. *One*, 3. *Two*, 4. *Three*.

Execute the movements as described under Preliminary Exercises on Land. While exercising the arms the legs may be lowered.

To execute the leg movements the instructor commands:

1. Leg movements, 2. *One*, 3. *Two*, 4. *Three*.

At *one* the knees are drawn up under the body as far as possible, feet closed and the knees parted a few inches; lower legs horizontal.

At *two* the legs are extended sideward, parting them as much as possible and forcing the water back with the soles of the feet.

At *three* the legs are closed. This should be done without bending them at the knees.

While the leg movements are being taught the instructor will allow the learner to hold a rope between his hands, the other end of which may be fastened to the platform. This will serve to keep the body from turning.

When these movements are faultlessly executed the instructor will command:

1. Stroke, 2. *One*, 3. *Two*, 4. *Three*.

At *one* the arms are moved sideward and when the hands are moving toward the body the knees are drawn up. These movements will be executed in such a manner that the hands are closed when the knees are fully drawn up.

At *two* the arms are extended directly forward and the legs sideward.

At *three* the legs are closed and the hands remain closed in the first position.

The cadence of this stroke is indicated by the command. The first command *one* is drawn out, indicating that the movement is a long and slow one, this is followed quickly by the other two which indicate that these movements are to be executed quickly and in quick succession.

After each stroke there is a slight pause.

When the stroke is executed properly by the numbers it should be tried without the numbers. When this is learned the instructor will hold the man by the rope only. Doing this he will allow the man to move forward with each stroke.

To satisfy himself that the man is learning to support himself, the instructor will slacken the rope slightly just as the stroke is begun, drawing it taut again when the extension is executed. Gradually the weight on the rope will grow less and soon the man will be able to execute a few strokes unassisted. Now he is encouraged to swim as many strokes as possible; the instructor being careful to be ready to draw the rope taut when assistance is required. When he is able to swim from 30 to 50 strokes he is given a trial to swim on time. This is done daily until he is able to swim from five to six minutes when he is transferred from the Beginners' Squad to the Qualifying Squad.

BREATHING.

This is always a source of great annoyance to beginners. Instructors must give the necessary information regarding the manner and time of breathing when the stroke is being taught. By doing so much will be gained.

Ordinarily each act of respiration is divided as follows:

Inpiration, followed by a very slight pause; expiration, followed by a pause, the duration of which is equal to about one-fifth of whole time required by one act of respiration. The act of expiration is always a trifle longer than that of inspiration.

In swimming all this is slightly changed. The inspiration is quick and deep, which is followed by a pause; the expiration is slow, occupying again as much time as the inspiration; then there is another slight pause.

The proper time to inhale is while the arms are being drawn towards the body; hold the breath while the arms are being extended, and exhale during the pause between the strokes.

QUALIFYING.

No one who is not able to swim at least ten or fifteen minutes, with the ordinary chest stroke, should venture into deep water. Until this is accomplished no one should, under any circumstances whatever, be allowed to swim in deep water without having a rope fastened to his body.

When a man is attempting to qualify the belt is placed around his waist. Every man is expected to swim as long as he possibly can. To qualify he must swim, at the very least, ten minutes. When circumstances will permit it this time should be increased to twenty or thirty minutes. After qualifying, instructions are

no longer received; the man is then transferred to the Practice Squad.

Usually at his first or second attempt to qualify a beginner will fail to do so. He will lose confidence and with it the stroke. His legs and arms will execute all but the right movements; he forgets to breathe at the proper time and is in consequence choked by the water. In order to overcome this the instructor will first encourage him to regain confidence and the stroke; if this is unsuccessful he must assist him until the stroke is again regained.

PRACTICE SQUAD.

A person is by no means considered even an ordinary swimmer if he is capable of swimming on his chest only. He must also accomplish the art of sustaining himself in the water with less muscular exertion than is required by the chest stroke. To learn to do this is the duty of the members of the Practice Squad. To develop endurance, swimming long distances should be encouraged.

It is not necessary to give systematic instructions in the following modes of swimming. Any ordinary chest swimmer can acquire them with a little practice.

SWIMMING ON THE BACK.

This should be diligently practiced, as it affords the exhausted swimmer an opportunity to rest himself.

I. With Leg Movements.

The body, fully extended, is thrown backward and rests in the water at an angle of about 20 or 25 degrees; the arms are thrown out sideward and bent, fore and upper arms at right angles to each other, palms down; the head is well thrown back; the chest thrown out and the back slightly arched. To propel the body the knees are drawn up as in the chest stroke, but only about half the distance, and then extended sideward and closed. Arms may also be folded or hands placed on hips.

II. With Arm Movements.

When the arms only are used the position is the same. The legs may be parted or closed, and the back is *well arched*. The arms, about half extended, execute a series of paddle movements toward the body.

III. Arms and Legs.

The leg movements of the I and the arm movements of the II may be combined. Or the same leg movements may be combined

with a backward and overhead reach of the arms. Here the arms are raised out of the water and moved as far backward as possible when they again enter the water and are forced toward the body.

TREADING WATER.

The body is nearly at right angles to the surface of the water, there being a very slight inclination backward.

I. Raise both knees alternately and extend directly downward. The forearms are held horizontally forward and the hands are used to press the water downward.

II. Execute the same movements raising both knees at the same time and extending the legs downward and sideward.

III. Execute either of the above without the use of the hands.

FLOATING.

The body is stiffly extended and rests in the water face upward; the back is *well arched*, the head well thrown back; the legs closed or parted, the arms are at the sides. The lungs should be kept well inflated and the respiration quick. If it is found impossible to float in this manner the hands should by a wrist movement only, be quickly moved inward and outward, palms down.

LEAPING.

Preparatory to leaping into the water the lungs should always be well inflated and care should be taken not to open the mouth, thus allowing the lungs to be emptied, when the body strikes the water. If the lungs are inflated the buoyancy of the body is of necessity greater and no discomfort is experienced, as the pressure of the water against the chest is not so apparent. The feet should always strike the water first. The arms may be held against the sides, overhead, or one overhead and the other against the side.

In order to rise quickly execute the leg movements of the chest stroke.

DIVING.

There are three kinds: the deep or perpendicular, the slanting and the shallow.

The first is the most difficult and the last the most dangerous.

The Slanting Dive.

Bend the knees and swing the arms forward and leap, turning the body in such a manner that it enters the water at an angle of about 45 degrees. Legs remain straight and closed.

The Shallow Dive.

Leap as in the slanting dive and just as soon as the head enters the water press the arms well back, throw the head back and bend the body backward as much as possible. Legs remain straight and closed.

The Deep Dive.

When executed from a spring-board (and it usually is), the body by the force of the spring of the board and the extension of the knees is thrown upward and slightly forward; the knees are well drawn; when the highest point of the leap is reached, the body is turned over forward, head down, and the knees extended; the arms are thrown out, hands closed. The body enters the water at nearly right angles to the surface of the water.

RESCUING THOSE IN DANGER OF DROWNING.

Many powerful swimmers have sacrificed their lives in the attempt to save others. This is due usually to the incautious manner in which those in danger have been approached. If "a drowning man grasps at a straw," how much more fiercely will he grasp at something more substantial? Once in his grasp and the chances are about equal that both will be lost.

In going to the rescue of a person, the swimmer must approach him from the rear, grasp him, if possible, directly under the arms and shove him forward. It is not necessary to be particular whether the head of the person being rescued is above water or not. In fact it is a decided advantage if the person loses consciousness, as it will be less dangerous and greatly aids the rescuer in his task. Once out of danger consciousness is quickly restored.

To assist a person, a swimmer, who has been taken with cramps or is exhausted, but who has not lost *presence of mind*, the following method will be found the simplest and the least tiresome.

The one exhausted will place his hands on a fellow swimmer's shoulders, sink his body as deep as possible, and in such a manner as to not interfere with the movements of the other. In this way a long distance can be covered with comparatively little exertion on the part of the one giving assistance.

To endeavor to assist a man who has lost all presence of mind, and is frantic with fear and despair, in this manner, would be suicide.

RESTORATION OF THOSE APPARENTLY DEAD FROM DROWNING.*

As soon as the body has been recovered, resuscitation should, if the weather is not inclement, be attempted on the spot.

1. Remove all clothing from the patient's chest.
2. Place the patient on the ground, face downward, grasp him under the abdomen and raise him up. This will give the water drawn in an opportunity to escape and free the air tubes.
3. Turn the patient over, and with a handkerchief wrapped around a finger clean the mouth and nostrils.
4. *Draw out the tongue* and hold it in that position with an elastic band, string or tape, passed around its base and under the chin; or by the fingers of an assistant enveloped in a dry handkerchief or cloth.
5. Use Sylvester's method of artificial respiration. Place the patient on his back with a roll of clothing under his shoulders — this roll to be large enough to elevate his shoulders and throw his head slightly to the rear. Kneel at his head and grasp his arms, one in each hand, just at the elbows; draw them outward, away from the chest, till they nearly meet overhead. This action imitates respiration. The patient's arms are then turned down and for a moment forcibly pressed against the sides of his chest. This action imitates expiration. Continue these movements perseveringly at the rate of about 15 times per minute.
6. While the above movements are being executed the patient should be stripped of his lower clothing. This *must not* under any circumstances whatever interfere with these movements. When stripped the body should be dried and covered with blankets, coats or other articles.
7. When natural respiration has been restored the limbs of the patient should be rubbed upward, toward the trunk, to stimulate the circulation; the body should then be covered with warm clothing to restore the warmth of the body. When possible hot flannels, bricks or bottles should be applied. To stimulate the vital actions small doses of aromatic spirits of ammonia should be given.

* In the above the method as laid down in the Hand-Book for the Hospital Corps, U.S.A., has been closely followed.

EMERGENCY RATIONS.

By CAPTAIN CHARLES E. WOODRUFF, Assistant Surgeon, U. S. Army.

An emergency ration consists of easily preserved articles of food in concentrated form, unsuitable for prolonged consumption, but to be used only when the regular ration is not available. It is also called the reserve or iron ration.

From a practical point of view it is quite easy to draw the line and say what rations are for emergencies, yet from the theoretical side it is extremely difficult to make such distinctions, because articles, which from the exigencies of military life are in constant use in the field and constitute the regular ration, are unsuitable for prolonged consumption and should be termed emergency rations. In order to make this clear, and in order to be able to study each of the new food articles manufactured for military use, and to give each its proper sphere of usefulness, it is necessary to go into the subject of food somewhat in detail and discuss all the rules governing the selection of military food. It has already been presented in a paper read before the Officer's Lyceum at Fort Assinniboine, Mont., and published in the journals of the United States Cavalry Association for Dec. '93 and March and June '94. I must refer to those pamphlets all officers who are interested in this subject. At present a few general rules will be given, so that we can understand the principles underlying emergency rations.

Food is for two purposes, repair of tissues and fuel. By the combustion of the foods used as fuel the potential energy is converted into heat, work, or other form of energy, and a certain number of ounces is necessary per day, just as in a steamboat a certain number of tons is necessary per day. This point is usually lost sight of by those who are not fully aware of the uses

of food, and in talking of concentrated food they talk as though the food should be condensed indefinitely.

Calculations made three years ago at Ft. Assinniboine, Mont., showed that the soldiers in garrison received 5 lbs. of food per day, of which about $4\frac{1}{4}$ lbs. were eaten, and that this $4\frac{1}{4}$ lbs. if concentrated by the exclusion of water and indigestible portions will still weigh over $2\frac{3}{4}$ lbs. Further condensation is impossible, just as it is impossible to condense anthracite coal. A definite number of ounces of fuel are needed daily if the human machine is to do a definite amount of work.

Food articles are susceptible of only moderate condensation. The best we can do is to exclude water and indigestible portions—further condensation is impossible, as will be mentioned later.

Foods must contain a certain variety of chemical substances, as follows:

	grammes.
Protein (nitrogenous substances found in meat, white of eggs, peas, beans, etc.)	150 to 200
Fats,	150 to 300
Carbo-hydrates, (sugars, starches)	400 to 600
Salts,	16 to 30
Certain stimulants and sedatives found in tea, coffee, cocoa, coca, guarana, kola, etc.	

These amounts vary greatly according to the energy expended, digestibility of food, clothing, climate, habit of individual, and a great many other causes too numerous to mention here.

Variety of food is necessary, for sameness cloys, except in rare cases of extremes of climate or during times of excessive exertion.

A certain amount of fresh food is absolutely necessary for health. Now as a ration of prepared foods can be made exactly like a ration of fresh articles, in all characteristics except freshness, and as this is the point on which the whole question hinges, it must be looked into with some detail. We can dry, concentrate, compress, and otherwise preserve food articles, and then arrange them into a field ration, so that the soldier will have the exact amount of protein, carbo-hydrates, fats, salts, heat, energy, weight etc., necessary, but there are missing certain

qualities whose absence will result in disease and death. In the first place a certain amount of indigestible material is necessary for the digestive organs. They are not fitted for digesting foods, all of which can be dissolved. There must be an undigested residue to keep the intestines active, and the stomach itself must have a certain bulk of material to work on or it will be inefficient. No doubt in future ages, when the earth is so over-populated as to be unable to grow enough food for man, we may be compelled to make our food synthetically in the laboratory, and by that time our stomachs and intestines may be far less in size and capable of digesting condensed foods, but that is very far off, and for the present we cannot subsist on such articles for any prolonged periods without deterioration of health.

If the concentrated food is in powdered or liquid form, another law of physiology is violated. It is essential that a portion of food should be in the solid form, so that a certain amount of mastication is performed. The movements of the jaws cause the secretion of saliva, which is an important digestive fluid, converting the insoluble starch into soluble and absorbable sugar. The importance of this can be imagined when it is remembered that as much as $1\frac{1}{2}$ quarts of saliva may be secreted in 24 hours, mostly at meal time. Hence, if the food is powdered or fluid, and mastication is not necessary, sufficient saliva is not poured into the stomach, and the starches are perhaps incompletely digested, and their subsequent fermentation in the intestines is one of the causes of the flatulence, colic and diarrhea which follow the continued use of such foods, as was the case in the Franco-Prussian war.

Again, many of the preserved foods have lost something necessary for health. Infants fed on fresh milk are healthy, those fed on condensed milk and certain dried infants' foods frequently have scurvy, and the same rule operates in adults who never have fresh foods. It may be denied that man must have fresh meat, fresh vegetables and fresh fruits, all three, yet it is quite probably so if he is to attain the full physical and mental vigor of which he is capable. It is such a safe rule that it is the real guiding principle in the feeding of soldiers in the field. In all civilized countries now, the greatest efforts are being made to get fresh articles in the field. Hence, the dried military foods which we usually supply

in the field, and look upon as the proper thing, are really emergency foods, for temporary use in the absence of the regular fresh garrison ration. In the future the field ration will be far more varied and will consist of fresh articles.

The greatest advances in this direction are being made in Germany and France. By means of cold-storage, which is now so perfect, they propose to ship fresh beef to the front by rail. It is truly surprising what wonderful changes this one matter of cold-storage is capable of making. The French propose to furnish the army with beef in this way, and the Germans already have large refrigerating rooms connected with slaughter-houses at Berlin, Frankfort, Wiesbaden, Hamburg, Mayence, Spandau, Coblenz, and Posen.

Fresh bread is equally necessary in place of hardtack. There are so many railroads now that it may be possible to ship fresh bread daily to the front, as was once done from Washington to the Army of the Potomac. The French are perfecting bakeries in wagons, so that the work is done on the march.

The hardtack itself will probably be replaced by the new war bread (*pain de guerre*) of the French, who have already substituted it for hardtack. The method of its manufacture is a profound secret; and I have been unable to obtain a specimen to exhibit. When thrown into hot water or soup it swells up like a sponge, and it is said to be virtually the same as fresh bread. It is evidently superior to hardtack, but it is also quite evident that it cannot take the place of fresh bread, for if it can not be eaten except soaked in hot liquid it does not permit of sufficient mastication. Recent reports throw some doubt on the accuracy of the above statements.

History informs us that as long as armies have waged war in an enemy's country, military men, seeing the necessity for carrying food along, and being hampered by insufficient transportation, have tried to concentrate the food. Experiments in this line have been made from time immemorial, but have failed, and we now see why they have failed. A scientific survey of the matter shows that success is impossible, even though we were to make concentrated food that would contain the exact amounts of the identical substances needed for fuel and repairs of tissues. The soldier's

field ration should theoretically contain fresh meat, fresh vegetables and fresh fruits, not daily, but in the ordinary variety and frequency usual with civilians of respectable standing. The nearer we approach to this state of affairs the better it will be.

In the absence of fresh articles, the field ration usually consists of bacon,hardtack,dried vegetables,coffee,sugar,salt, and perhaps potatoes if they can be carried. Sometimes bacon,hardtack and coffee are the sole things carried. The ration is deficient in protein, but it contains enough fats and carbohydrates and yields sufficient energy. It cannot be used exclusively for any length of time without running the risk of lessened vitality and perhaps scurvy. Notwithstanding its defects, it seems to be the ration least objectionable, because after years of trials and experiments, the field ration of the principal civilized nations has crystallized into something like this shape.

Theoretically then, the above dried ration is an emergency one; but what we wish to describe now is the ration which the soldier packs in his haversack and is not to use except when he cannot get the regular food. We will call this the emergency, reserve, or iron ration. The expression "iron ration" is becoming applied solely to that very short weight, highly concentrated ration intended for but a few hours, but which cannot replace the regular ration. A liberal emergency ration can be made to take the place of the regular ration, safely and for quite a prolonged time. It might be stated that the expression "reserve ration," though often used synonymously with both the above, is often given a more restricted meaning, as when it is used to refer to a ration of the usual field supplies, kept in the food-bag, but not used unless the wagons are delayed. It is reserved for emergencies, though it is neither an iron or an emergency ration. While the European armies have made very considerable advances in this direction, we are, practically speaking, about where we were a century ago.

If the American soldier is to be detached from his wagons, he is given from one to five days' supply of the following:

Bacon,	-	-	-	-	$\frac{3}{4}$ lb.
Hardtack,	-	-	-	-	1 lb.
Coffee, sugar and salt,	-	-	-	-	$\frac{1}{4}$ lb.

According to the service he is doing the amount varies from two to ten lbs. The longest time any large body of troops was detached is said to be five days at Chancellorsville, but I do not know what weight of rations the soldiers carried. Crook was enabled to make successful moves against Indians by having the soldiers carry from two to three days' supply, without which he would have been very much handicapped. A reserve ration is now an essential part of the field equipment of the soldier of the great armies of Europe.

At the present time reserve rations are built upon the above as a basis by the addition of manufactured articles to increase the variety, and make up deficiencies.

It is not practicable nor is it desirable, as already explained, to have a single prepared food to take the place of the whole ration, unless the emergency lasts for a few hours. The greatest ambition we have at present is to piece out and improve what experience shows has served the purpose better than anything else.

Canned goods, baked beans etc., are very desirable for field use when the fresh things cannot be obtained, but they are unfit for emergency rations as they are too heavy. It is useless to carry around the water these preparations contain.

Soups.—The chief manufactured articles are the compressed dessicated soups. They have now been perfected after twenty-five years of practical use, and as a matter of fact they constitute an essential part of many iron rations. The first of these successful foods is the celebrated *Erbswurst* or iron ration of the Germans, a combination of pea meal and other articles, invented by a German cook named Grunberg, whose secret consisted in his method of preserving the legumine from the decay to which it is so prone. The German government purchased the secret for \$25,000. It was first used on a large scale in the Franco-Prussian war by the second army commanded by Prince Frederick Charles, who reported its great value to the War Ministry July 16, 1870. The food was composed of pea meal, fat and bacon, and an extensive factory for making it was established at Berlin under the supervision of Army Intendant Englehard. The factory commenced work on August 8, and in a few days furnished the first 100,000 pea sausages which, under the name of *Erbswurst*, became so widely known. This article of food met with such general

approval that for a long time the factory had to supply the whole army with it. The factory ultimately extended its business to making other kinds of meat preserves and altogether sent some 40,000,000 rations to the field army. Other factories were established at Frankfort-on-the-Main and Mainz. In more recent years factories established at Mayence, Spandau, and Thorn, are capable of turning out daily 426,000 cans of meat, 200 grammes each, and 470,000 rations of compressed vegetables.

This description of food had the advantage for the commissariat in being lighter for transport, and for the troops, especially for those on outpost duty, in being more easily prepared for consumption. The unavoidable sameness of the ration was successfully compensated for by the large stores of wine found in the neighborhood of Paris, and by the occasional issue of an extra ration of brandy.

Parke's "Hygiene" states that when it was used too constantly not only did the men dislike it, but it was liable to produce flatulence and diarrhea. A soldier who has lately returned from a visit to Germany informs the writer that the soldiers in private conversation still speak of it in the highest terms.

It is understood that this food is given to the German soldier with strict orders not to use it until he is separated from the wagons and cannot get the regular ration. In using it he procures a cup of hot water into which he stirs the powder. It makes a rich, savory and nourishing soup. The "iron ration" has been lauded by enthusiasts as the chief cause of the German success in the Franco-Prussian war. Without erbswurst it would have been impossible for the soldier to stand the fatigue necessary to carry out the plan of the campaign—human beings could not have made the effort. It is not known how much truth there is in such a strong statement. Several years ago it was issued for trial to some U. S. troops and the reports are said to have been uniformly favorable, and it was demanded in larger quantities.

The specimen shown was furnished by Meyer & Lange, importers and jobbers of fancy groceries, 195 Franklin street, N. Y. They are the American agents of the manufacturer, C. H. Knorr, Heilbronn, a. N.; Bregenz, Austria; and St. Margrenten, Switzerland. Knorr supplies the German army the bulk of the goods of this nature.

The composition of these is unknown, but former analysis shows them to contain the amounts of protein, carbohydrates and salts, which added to some bread and rice will make up the requirements of a daily food allowance. Each sausage is 8 inches long, $1\frac{1}{2}$ inches thick, contains 7 ounces of material, and one is used each day, but it will make twelve plates of thin, palatable soup. In the short weight German ration to be described, the seven ounaes of preserved meat (supposed to be erbswurst) is to last three days.

Knorr also makes other condensed soups in tablet form, each tablet being $2\frac{3}{4}$ inches square, and a little over $\frac{1}{2}$ inch thick, weighs about 4 ounces and will make six plates of soup. Samples are at hand of bean, mock-turtle, green corn, pea, barley flour, and potato. As far as known they are excellent, and to be recommended for trial. They are available for garrison, field or emergency use, and would introduce an agreeable variety into a monotonous ration. Each tablet has the food value of about 1.8 lbs. potatoes. All of them except potato probably contain more protein than the potato ration, and are therefore more valuable as food. They could be issued in lieu of potatoes for the field, five tablets being equivalent to about eight potato rations.

Coming to America there are two firms from whom I have obtained samples. The Weidner's soup tablets were formerly made by a Chicago firm, "The American Ready Food Co.," now gone out of business, but whose stock is handled by Ried, Murdock & Co., 3 State Street. These tablets are almost identical with Knorr's, in size, weight and nutriment. The following samples are at hand: lentil, barley flour, bean, farina and tapioca julienne, but pea and other kinds have been made. I have personally tried them in camp, and as I liked them very much, I can unhesitatingly commend and recommend them. I did not like to camp out without having a supply of them. I am very sorry their manufacture has been suspended, but as far as I know the failure was due to the expense attending their introduction into family use. They are almost unknown and there is but little demand for them. If American housekeepers refuse to use them, preferring to make their own soups, then the only thing to do, if they are found necessary in our army, is to establish government factories and

make them ourselves, as the Germans did in the Franco-Prussian War.

The other American firm is the California Dried Food Co., 103 Commercial Street, San Francisco. They have sent me samples of vermicelli, pea and bean soups. They have advertised tomato, vegetable and fish chowder soups, but probably do not make these now. Each package is $1\frac{3}{4} \times 3$ inches, and nearly 1 inch thick, weighs 2 ounces and makes one quart of soup. They have been highly recommended, and Capt. Sharpe, A. C. S., who inspected the plant and product, has reported in their favor. They are 7 cents apiece.

I have been unable to obtain samples of the condensed soup which forms a part of the reserve ration of the French soldier. It is presumably but little different from those already mentioned.

In England there is quite a variety of prepared soups. As far as known, the first to be extensively used by soldiers, and proved to be excellent was Kopf's pea soup, also called English erbswurst. The samples are small cylinders 2 inches in diam. and $2\frac{1}{2}$ inches long, weighing 4 ounces, containing enough to make a quart of soup. It is made of pea meal and contains sufficient extract of beef to make it stimulating and give it a flavor. The samples I tried several years ago were excellent, though I must confess that they are rather too insipid to use for any extended time. It has been used all over the world wherever British soldiers have been stationed. It is believed that it was found to be an available emergency ration, and an article for occasional general use.

The company had American branches in New York and Boston, but have gone out of business here, probably because there is not enough popular demand for such articles. The present samples were furnished through the courtesy of E. C. Hazard & Co., wholesale grocers, 117 Hudson street, New York.

Its composition is as follows:

NUTRIENTS.						
Water	Protein	Fat	Carbohydrates	Cellulose	Ash	Calories per lb.
4.78	21.09	17.25	46.45	4.40	6.03	2074.

Frederick King & Co., London and Belfast, make dessicated tomato and brown soups, supplied in metal canisters. They are made of beef and vegetables and one part will make 16 parts of soup. They have received high awards, but it is not known whether they have been used in military life. They are not suited for our purpose as emergency foods because they require careful preparation, slow boiling 30 minutes, or simmering for some time longer, but for a company or officer's mess they are quite suitable.

"Lazenby's solidified soup squares" are made by E. Lazenby & Son, 18 Trinity street, London, S. E., England. They come with the recommendation that they are furnished from time to time to the "Indian Office" and "War Office," and are looked upon with great favor. Each "square" is about $2 \times 1\frac{1}{2} \times 1$, weighs about 2 ounces, makes $1\frac{1}{2}$ pints soup, and probably contains the heat energy of 1 pound potatoes. It is stated to contain the extract of $1\frac{1}{2}$ pounds beef.

The samples at hand are mulligatawny, carrot, lentil, green pea, household, haricot, tomato, gravy, julienne, vermicelli, and tapioca. They are about 10 cents apiece. Though they are made for domestic consumption, they are excellent for field use, particularly for an officer's mess. The world-renown of the maker is sufficient guarantee for their purity, and it is probable that a trial will find them excellent. Some of them are suitable for the soldier, and are available as a part of an emergency ration. In their present form they could take the place of the fresh vegetable ration.

Meat Preparations. The "ration cartridge" of the London Bovril Company is probably the best for our purpose. It is designed for soldiers and others in similar circumstances. Being new it has not yet been extensively tried as far as I know. The Right Hon. Lord Playfair is chairman of the company, and his high authority is guarantee that the rations are properly compounded. The ease with which they are prepared for use also recommends them. It is merely sufficient to add double the quantity of boiling water and let stand ten minutes or longer by the fire. In total nutrient it is essentially the same as some specimens of erbswurst. It is made partly from beef, not extract of beef, thus it contains both the nourishing and stimulating

qualities of beef. This will be referred to again. These rations are made of two varieties, the red-cartridge (red-label) containing pea meal, beef etc., and the blue-cartridge containing potatoes, beef etc. They are of equal weight ($\frac{1}{2}$ pound), and are intended for use on alternate days. Though they are about the same bulk as the German erbswurst they are of different shape, the red cartridge is $3\frac{1}{2}$ inches long, the blue is 5 inches, both are 2 inches in diameter. The one containing potato is the larger, contains more water, but less food energy.

ANALYSIS OF CARTRIDGES.

	Water	Total	Protein	Fats.	Carbo-Hydrates.	Mineral Matter.	Calories of Potential Energy in One Pound Each
Blue	10.83	89.17	11.62	9.58	59.58	8.39	1728.2
Red	6.50	93.50	12.18	19.12	56.86	5.34	2090.5

Blue—Potatoes and Beef.

Red—Pea Meal and Beef.

There is another British preparation called the "Armory" field ration. It consists of beef with pudding and vegetables and is well liked. It is not known who makes it or where it is made.

An iron ration which was favorably considered in France about ten years ago was compounded of the following ingredients:

Powdered Articles	Grammes.
Meat,	20.00
Peas, Lentils, Rice, Haricot,	80.00
Pot-Herbs,	5.00
Beef-Fat,	18.00
Hog's Lard,	7.00
Salt,	9.00
Pepper,	.04
Total	139.04

Its food value was as follows:

Grammes	Protein	Fats	Carbo-Hydrates	Calories
	33.72	26.20	44.08	572

The leading article adopted by the British for troops in the field in India, Africa and elsewhere, is the "pemmican," a preparation of beef, with fat and salt. It is supplied in tin cans $2\frac{1}{4}$ inches

in diameter, and 2 inches long, weighing 4 ounces, and equivalent to 1 pound of meat. The method of manufacture is a trade secret. It is made by J. Bancroft, M. D., Queensland, the agent being Mr. James Gray, of Old Change House, 21st Old Change, London, E. C. It can be eaten without any preparation, and it can be made into beef tea, hash or soup, by boiling with vegetables. It is said that it will keep sound for years even after free exposure to the air.

Being equivalent to 1 pound of meat, the above, of course, gives sufficient salts and protein for emergency use, but not so much as needed daily. It cannot contain much fats, certainly not nearly enough for an American soldier except as an emergency food. It contains no carbo-hydrates, and these are supplied in another part of the official emergency ration. This second part consists of cocoa and honey, in a tin can of the same size as the can of pemmican. The agents are Dunn & Hewett, of 136 Pentonville Road, London. These two preparations are supplied by the agents to the general service corps, by which they are united into one package. The cans are placed bases together, and sealed into one package with a tin strap. Instructions for use accompany each ration. The soldier is not allowed to use them until other supplies of food cannot be obtained. It is said that several years of practical use show the above rations to keep perfectly in all climates and under very difficult circumstances. A $\frac{1}{2}$ pound sample of cocoa paste, supplied by Dunn & Hewett, is in a tin can $3\frac{1}{2}$ inches long, $2\frac{1}{2}$ wide, and $1\frac{1}{4}$ inches thick. It is an excellent article for an officer's mess kit, and also for an emergency ration.

The "Patent Ration" is a new British preparation now under trial, but said to be the best tinned ration ever made. It is put up by Machonochie Bros., of London, whose factory is at Lowestoft. It is supplied in tin cans weighing $1\frac{3}{4}$ pounds, being $5\frac{1}{2}$ inches long, 3 inches wide, and 3 inches high. It is arranged with two tin straps to sling over the waist belt, and one side is depressed so as to fit the curvature of the belt. It contains $\frac{1}{2}$ pound vegetables (potatoes, carrots, turnips and onions) and $\frac{3}{4}$ pound of the best beef or mutton. In small recesses in the bottom of the can are secured rations of salt and pepper and a

key for opening the can. It can be eaten without preparation, or made into hash or soups. It could be imported, and is worthy of extended trials. The Machonochie Bros. patent ration, made several years ago, is said to have contained, besides the meat and vegetables, some preserved soup, milk, sugar and cocoa, all in the dried powdered state. It was eaten with biscuit, and said to be excellent.*

The British formerly had a meat biscuit, which was well thought of. It consisted of 25 per cent. meat and 75 per cent. flour, required heating to 500 F. (?) and by some was thought to lose the virtues of the meat in the process of cooking.

Preserved meats from America, Argentine, and Australia have been extensively tried in Europe, those from Australia being preferred in Britain. Though useful for the field they are too heavy for emergency rations.

I believe I am safe in saying that all the dessicated soups mentioned will keep in any climate, under all extremes of temperature, providing they are kept dry. None of them are expensive.

Miscellaneous Articles.—Bread biscuits made of the whole wheat are used by the British, and are available as a field ration and probably also as an emergency ration. Each biscuit weighs $2\frac{3}{4}$ ounces and measures $4 \times 4\frac{1}{2}$ inches. They are packed in tin-lined cases to protect from weevil. Each case weighs 80 pounds gross, so that two cases make an ordinary pack mule load and four a camel's load.

Condensed milk adds greatly to the comfort of field life, but it can be omitted without hardship. It is recommended for a small mess, but is not available for an emergency food. It does not keep in hot climates longer than six months.

Evaporated vegetables are used in the navy, and are said to be satisfactory as substitutes only. During the rebellion they were not liked in the army, probably because of improper preparation. In the British service they are not liked as they are not nutritious and do not keep well. It must be remembered that vegetables, like carrots, turnips, onions, beets etc., contain very much water and indigestible cellulose, and but little nutriment. In the

*Rations identical with the above have for years been canned by the Chicago packing companies, Armour, Swift & Co., for European armies and for ships. Francois Tantry of Chicago, makes the most palatable one, containing barley in grains.

dried condition they are still very bulky for the amount of nutrient. They are therefore worthless for emergency rations, but for a small mess, in the absence of fresh vegetables, they are an excellent substitute, and to be recommended. It is doubtful whether they should be sent into the field for the soldiers, but the matter should be tested by extended trials. It is criminal for us to be guided wholly by the results of the war in this matter, because preparations now made are far superior to the first efforts made a generation ago. In the same way we have allowed ourselves to get twenty-five years behind the times, by holding to the unfavorable reports on the use of erbswurst in the army. Drying destroys some ingredients of the vegetables, and to make up for this the British always issue lime-juice and sugar with dried vegetables.

Knorr, who makes the soups for the German army, also prepares dried vegetables, a $\frac{1}{2}$ pound package of which is 6 inches long and 3 inches square. One ounce is to be added to one quart of soup stock, soaked two hours and then boiled forty-five minutes. It may be added to bouillon. It is recommended for an officer's mess. The vegetables are in pieces and not ground up, and this is an advantage.

Baking powder is used by the U. S. soldier in the field, but the British soldier uses yeast cake. At home the Canadian yeast cake is used, but it does not keep well. For foreign service the best yeast cake is that made by Hupaolo & Co., 101 Leadenhall street, London.

Pickles are an important item in the British foreign service. They must be sealed to prevent evaporation. Lime juice is also an essential, and is transported in wicker-covered jars. Glass breaks too easily, and wooden vessels cause spoiling of the article.

Such miscellaneous articles as those above mentioned are of interest to us here, as showing the lines on which the preserved field ration supplements a pure emergency ration, though but few of the articles are available for pure emergency rations.

Stimulating Rations.—It has already been stated that certain stimulants seem to be a necessity in civilized life. Under the influence of tea, coffee or tobacco man seems to be brought to a higher efficiency than without them, though they are not necessary to mere existence. They keep up cheerfulness and enable

men to stand fatigue and privations while their absence may cause depression, homesickness, feebleness, and, indeed, may lead to defeat in battle. Depressed troops do not fight well, and cannot be kept well in hand. Tea and coffee are most wisely a part of regular and emergency rations. It is not wise to go to the extreme of stating that tobacco should be a part of the ration, because there are certain vicious features inherent in tobacco that will always weigh against its official recognition. Notwithstanding its bad qualities, a wise military leader will see to it that his men are not deprived of its use, or he will regret his carelessness. Coffee must be properly roasted, a difficult thing to do in the field. It would be better to have it roasted and ground at the base, packed in small air-tight cans to prevent deterioration, and shipped to the front. This should be done by the Commissary Department to prevent adulteration, which I believe was a source of much trouble during the rebellion.

For emergency use coffee has been prepared in a variety of ways. During the war it was made into extracts and mixed with sugar, so that all that was necessary was to add a little to a cup of hot water. I believe it was not an unqualified success.

There is on the market at present an extract of coffee, supplied in bottles holding about 2 or 3 ounces, and containing enough to make 50 cups of coffee. Though it does not make a first-class beverage, it is far better than nothing, and for small parties on scouting or other detached service where the bulky articles could not be carried, it is excellent as a part of an emergency ration. It cannot be recommended for other purposes. It could be placed in capsules, each capsule being enough for one cup of coffee.

Coffee compressed into tablet form is excellent for our emergency ration, but unfortunately these tablets do not keep long. I do not know the reason of this, but probably it is because of the evaporation of the aromatic substances. The liberation of the oil of coffee has something to do with it. Gounds & Co., The Licensed Victuallers Tea Co., 1 Southwark Square, London, S.E., make compressed coffee tablets to order, but do not keep them in stock.

There is a French preparation made expressly for military use. The coffee is roasted, ground and compressed by what is called

the "Martin-des-Rosiers" process, patented. It comes in hermetically sealed tablets, so that the aroma is retained. Each tablet is $2\frac{1}{2}$ inches long by about $1\frac{1}{2}$ or 2 inches wide and $\frac{1}{4}$ inch thick, weighs 1 ounce and will make two good cups. It has been supplied to the French army and navy, the Jackson Harmsworth Polar Expedition and other travelers' expeditions. The process is advertised as approved by the Public Committee of Hygiene of France, (Dec. 23, '89), by the Minister of War, (Jan. 7, '90), and the Academy of Sciences of France, (March 17, '90.)

It is also made in London, S. W., at 61 Pall Mall, at "The Military Equipment Stores." It is supplied in four qualities, the last being mixed with chicory. The prices are 2s 5d, 2s 2d, 1s $10\frac{1}{2}$ d per pound, or per cup of coffee from 2c to 1c.

This article seems to fill the requirements of an emergency ration.

Many old campaigners think that for field use tea is a better stimulant than coffee. In cold climates tea is preferred by the natives, and perhaps it is the best. It is somewhat difficult to transport owing to its bulk and this objection is nicely overcome by compression. Several firms now supply compressed tea. The sample at hand is made by Gounds & Co., No. 1 Southwark Square, London, S. E. It has been supplied for years to the N. W. Canadian mounted police, and British troops have taken it into the field in various parts of the world. As far as known, it has proved to be eminently successful.

Each tablet weighs $\frac{1}{4}$ pound, and is $5\frac{1}{4}$ inches long, $1\frac{1}{2}$ inches wide, 1 inch thick, the original bulk of tea having been about three times this amount. The tablet is divided into eight pieces, each of which is $\frac{1}{2}$ ounce and equivalent to three teaspoonfuls of ordinary tea. Each piece will make two fairly large cups of tea of medium strength. Compressed tea is said to be more economical than the ordinary article, because the compression breaks up the vegetable cells which contain the theine and aromatic substances. These are liberated, with the result that in using compressed tea the whole strength can be taken up by boiling water in five minutes while such a result can not be accomplished with the crude tea in less than five hours. This article is to be recommended for an emergency ration. The cost is 2s 6d per pound.

The Compressed Tea Co., 17 and 18 St. Dunstan's Hill, London, E. C., controlled by Brooke, Bond & Co., also makes a compressed tea. The $\frac{1}{4}$ lb. block is of the same size as the above, but is divided into $\frac{1}{4}$ oz. sections, which facilitates their use. The wholesale price is from 29c to 56c per lb. according to quality. Each medium sized cup of tea then costs from $\frac{1}{2}$ to 1c if the tea is just fairly strong.

The above firm only makes compressed tea on order, having the machinery, but they do not keep it in stock. The domestic demand is probably very small.

The "Military Equipment Stores," 61 Pall Mall, London, also makes compressed tea, as well as the coffee already referred to.

**Saccharine Tea and Coffee Tablets.*—The sugar ration amounts to 2 2-5 ounces. It is useful in the economy as the eighty grammes of carbo-hydrates contained therein yield 280 calories of heat out of the daily total of some 3500 or more. It is not necessary, for perfect health can be maintained without it, but in that case additional energy is obtained from a trifle morehardtack or bread. The latter are really more useful, for although they consist in great part of starch which has the same food value as sugar, they contain protein and fat also. If sugar is omitted, as in the German emergency ration, we can make up the total energy to the proper amount by increasing the hard bread by two ounces, so that the only advantage is in having fewer articles. In the very short weight ration, called the poverty ration, the loss of the small percentage of energy in the sugar is of no material importance.

The real use of sugar is as a spice and this fact is exemplified in the dietaries of certain foreign nations who use less than 1-5 as much sugar as Americans, and who get so little food energy out of the small amount of sugar they take, that we can safely discard it as food. In the field, particularly when on short rations, the sole use of sugar is as a spice to sweeten tea or coffee. Now if sugar is omitted we can use saccharine which is 500 times sweeter than sugar, and there is no appreciable increase in the weight carried. Two and one-third grains of saccharine will

* Condensed coffee in cans like condensed milk is not a success. Recent reports would rather indicate that no preparation of coffee will keep in good condition.

sweeten as much coffee as 2 2-5 ounces of sugar. Saccharine is one of the host of substances derived from coal-tar. It has no appreciable effect on the body and can be taken safely for long periods in amounts sufficient to sweeten all the articles of food we desire. It is not a food, is not changed in the body, and furnishes no energy whatever. Since its introduction, in about 1886, it has been used for numerous bodily conditions where sugar is injurious, and is used to an immense extent in sweetening, preserving and preparing foods and beverages.

Sample tablets have been sent to me by E. L. Prussing & Co., 34 Wabash Ave., Chicago, Ill., who are the agents for the manufacturers of saccharine, Fahlberg, List & Co., Salbke-Westerhusen, a. Elbe, Germany. It retails at one dollar per 300 tablets, each sufficient to sweeten a large cup of coffee. It is far cheaper in wholesale quantities.

As mentioned before these tablets are of no use in an emergency ration because the weight of sugar saved will have to be made up by increasing thehardtack, and the number of articles will be exactly the same, but for a small mess chest where bulk is a great item, they should find a place with pepper, salt and mustard. They are excellent for this purpose, and to be recommended for an officer's mess.

Saccharine has been added to compressed tea and coffee tablets, and in this form is most excellent for an emergency ration, whether for long or short periods. Not only is there one less article, but in short weight rations there is a saving of bulk and weight while the soldier still has his coffee or tea sweetened. The samples were supplied by E. L. Prussing & Co., but are not for sale in this country at present. They could undoubtedly be obtained from Germany by communicating with the above firm. The tablets of tea are 1 inch square and $\frac{1}{4}$ inch thick, those of coffee 1 inch square and $\frac{3}{4}$ inch thick, each intended for one cup of hot water. They are supplied, or at least have been supplied, to the German army. They are excellent for an officer's mess kit.

Saccharine has one property which might prove it to be of extreme value as a military substitute for sugar, not only for

emergency, but for general field rations. It is an antiseptic of considerable power. In the ordinary solutions it will postpone the spoiling of foods for many days, and in somewhat stronger solutions will preserve them for considerable periods. It is also prescribed by physicians for certain forms of intestinal diseases which are made worse or kept up by the sugar in the food. These diseases often due to infection are the bane of camp life, and there was terrific mortality from them in the late war. Saccharine may assist in preventing and curing these cases.

Beef Teas.—For a great many years military men have recognized the necessity for other stimulants than tea or coffee. There is a very limited use for them, as for instance to revive flagging troops just previous to battle, after forced marches, after extended fighting, or while waiting for delayed meals. For such purposes any form of spirituous stimulants is inappropriate, and their use as a regular issue has been abandoned. Not only do they cultivate drunkenness among soldiers, but the stimulation is followed by a depression that renders the men incapable of duty, and the stimulation is a disorderly one, owing to interference with co-ordination. Spirituous liquors (brandy and whiskey) are still regular issues in almost every European army in the field. They seem to consider from one to four ounces necessary for each soldier, but as a usual thing it is only issued when food is diminished or a very great fatigue is to be borne. Wines and beers are parts of some European regular rations, but their use will never be tolerated in the United States, and it is quite likely that they have inherent military vices almost as bad as whiskey. They are too bulky for our purpose of emergency ration, even if they were appropriate.

We must look for stimulants to articles that are small in bulk, not followed by depression and not disorderly in action. Beef tea is one of the articles available for this purpose. It has been highly recommended for a long time. As there is a widespread misconception of the exact food value of beef tea, military men must be informed of its precise sphere of usefulness. It is not a food except in a very limited sense. It contains so little nutrient that we can safely look upon it as a pure stimulant. In making beef tea the finely chopped beef is slowly boiled for several

hours, and the nutritious substances (proteins) are rendered harder and harder, and finally rejected, but the stimulating extractions are slowly dissolved in the water. If the water is excluded by evaporation, we have ordinary extract of beef, like Liebig's and Armour's, with the exception that the commercial extract is made in closed boilers at high pressure. When a person is informed that a teaspoonful of a certain extract of beef represents several pounds of beef he is liable to think it is as nourishing as several pounds of beef, whereas the nourishment is left behind in the boiler. Baron von Liebig confessed to this fact thirty years ago.

Beef contains about 17 per cent. of protein, so that if all the water, fats, bone etc., were excluded, it would be impossible to condense the beef to one-sixth the bulk. One ounce of such a dry preparation could never equal more than six ounces of fresh beef, excluding the fats, and a capsule containing seventy grains of condensed beef cannot be any more valuable than about one ounce of fresh beef. Four ounces of the English beef emergency ration equals only one pound of beef. The amount of nourishment in any beef powder then cannot be so enormous after all, and the uses of such preparations are limited to a very narrow field. They are valuable in military emergencies, as they add some little nourishment, while at the same time they stimulate.

As a stimulant when the system is flagging from fatigue or other cause, bouillon or beef tea is excellent, and as an emergency ration it has been highly recommended for a long while. I have received samples of an excellent beef extract put up in capsules of sufficient size to make an ordinary cup of bouillon. They are already seasoned and from a personal trial I can pronounce them excellent in every way. They are called Anker's bouillon capsules, and are made by the Anker Bouillon Capsule Manufacturing Company, of Jersey City, N. Y. They are handled by Wiley & Brush, 91 Hudson street, N. Y. At the wholesale rate they cost about two cents apiece.

There are several other varieties on the market, perhaps equally as good. I have received samples of Johnston's beef extracts in capsules. They are made by the "Capsule Food Co.," of Phila-

adelphia, and sold by the Cheltenham Food Co., (W. M. Shoemaker), 51 Franklin street, N. Y. This preparation is claimed to have some of the nutriment of the beef as well as the stimulating extractives, and serves as a food as well as a stimulant.

Another good preparation for military use is the Bovril Tablets, made by the same London Bovril Company which makes the red and blue cartridges referred to above. The product is solid, and supplied in lozenges and tablets, and it is claimed that they contain fifty times as much nourishment as an equal weight of ordinary beef extract. There is also a fluid preparation, a teaspoonful of which, added to a cup of boiling water, makes a nourishing and stimulating bouillon. The samples were supplied by the New York agent of the Bovril Company, Mr. Wm. M. Shoemaker, of the Cheltenham Food Co., 51 Franklin street. They can safely be recommended for our emergency uses. Some of the military soups contain beef extract, but the latest and best of them contain the beef also, and are therefore more nourishing.

Specimen Emergency Rations.—The French soldier carries two days' reserve rations, which he is not allowed to consume except upon an order from higher authority. The articles are as follows:

Grammes		approx. oz.
1200	hard bread,	42
200	rice,	7
500	preserved meat,	17
50	condensed soup,	1 $\frac{2}{3}$
40	salt,	1 $\frac{1}{3}$
62	sugar,	2
48	roasted coffee,	1 $\frac{2}{3}$

The hard bread is to be replaced by the new war bread (*pain de guerre*), but whether in the same amount is not known. The above weighs about four pounds ten ounces, a daily amount of two pounds five ounces. In addition to this the mounted soldiers carry one day's reserve oats. The fault with this ration lies in the deficiency of fats, rendering it improper for our colder climate. In addition there is insufficient energy, which could be made up by bacon in the United States.

There is also said to be an "iron ration" consisting of $\frac{2}{3}$ pota-

toes and $\frac{1}{3}$ meat, the latter being peptonized or partly digested by Koch's method, and it can be eaten without further preparation. The weight is not stated. In England the same ration costs two cents, and is put up in tins. It keeps indefinitely under all conditions.

The German infantryman also carries two days' emergency ration, which is not drawn upon except in cases of urgent necessity, or when it can be replaced by a fresh supply. The cavalryman carries but one day's rations.

The former ration intended for three days is as follows:

17.5	oz. hard bread.
7.	" preserved meat, or 6 oz. bacon.
4.5	" rice or 6.75 oz. meal.
.875	" coffee.
.875	" salt.

This is an illustration of what in France is called a "poverty ration."

The above weighs two pounds four ounces. I believe the above preserved meat refers to erbswurst, and if it contains as little fat as it is said to contain, there is a deficient proportion of fats. If the bacon is used there is a deficient proportion of protein, but enough fats. The daily amount is only twelve ounces water-free food, which is very deficient. In other words it is expected that in case of emergency the soldiers can get along for two days with this, but that the regular rations will be brought up at the end of that time. The present ration for two days may be more than two-thirds of the above scanty three days' ration.

In the British service the custom is to permit inventors and makers of prepared military foods to furnish samples for trial. Officers and men are also authorized to try these things at their own expense. There are but few articles adopted. The emergency ration of pemmican and cocoa already described is a "poverty ration," which is not to take the place of the field ration but to bridge over a very short interval comfortably. They also have a compressed vegetable ration of unknown composition. It is used with Chicago compressed beef more as a field ration than as an emergency ration. It is supplied in tins of sixteen pounds or less.

The Italian iron ration consists of the following, valued at 1 franc:

2 biscuits, (hard bread,)	400 grammes,	(14 oz.)
Preserved meat, (in tins,)	220 "	(8 oz.)
Total weight,	620 "	(29 oz.)

The regulations governing the use of this ration are not known. It suffices but for a short interval.

Switzerland has an emergency ration consisting of $8\frac{3}{4}$ oz. (250 gr.) preserved meat, 50 biscuits, (5 gr. each), weighing $8\frac{3}{4}$ oz. (250 gr.), and $3\frac{1}{2}$ oz. (100 gr.), of compressed pea or bean soup. The biscuits are in a cloth bag, the soup in parchment paper, and the meat in a tin. This weighs somewhat more than twenty-one ounces, without the packages. Two days' rations, weighing forty-two ounces, are carried on the person, being properly packed in a water-proof ticking bag. Two days' extra supply is carried in wagons. The above is a very convenient "iron ration."

The Austrian reserve ration used during the march on mobilization is—

Hard bread, 250 grammes,	-	-	($8\frac{3}{4}$ oz.)
Preserved meat, 290 grammes	-	-	(10 oz.)
Preserved soup, 36 grammes,	-	-	($1\frac{1}{4}$ oz.)
Salt, sugar, coffee, each, 25 grammes,	-	-	(8.16 oz.)
Total weight, nearly	-	-	21 oz.

Another reserve ration, said to be used during operations of the army is—

Sausage, 200 grammes,	-	-	(7 oz.)
Salt, sugar and coffee, each 25 grammes	-	-	(8.10 oz.)

Each of these is a poverty ration, totally insufficient for health, and not expected to do more than tide over a few hours. The larger one resembles the Swiss ration, but is inferior in that it contains less protein.

Portugal has an emergency ration consisting of biscuit, sausage, coffee and sugar in unstated proportions. Two days' rations are carried, the total weight being three [two] pounds four ounces, thus making the daily allowance only eighteen ounces. It is an "iron ration" in principle.

The United States soldier carries reserve rations in amounts varying with the exigencies of his service, the number of rations being determined by the commanding officer. The greatest number ordered during the war was five, as already stated, but two or three is the usual number. The articles are:

1	pound hard bread.
$\frac{3}{4}$	pound bacon.
$2\frac{2}{5}$	ounces sugar,
$\frac{1}{2}\frac{6}{5}$	ounce salt.
$1\frac{7}{25}$	ounce roasted coffee.
$\underline{2}$	pounds total weight.

This is not a proper ration, being deficient in protein, so it is necessary to add preserved meat or peas or beans or all three. Taking the English Bovril cartridges on faith, which we need not do by the way, it will, when added to our present ration, make a very liberal emergency food for soldiers doing heavy work, but the total weight would be two pounds eight ounces, and a two days' supply would be five pounds, considerably larger than any European emergency ration. Indeed, it would be possible to reduce the bacon slightly, say to eight ounces, when the ration would be of almost the same weight as that of the French, and the food energy would be about that of the garrison ration of the United States, as determined by the writer. Our ration would then be:

16	oz. bread.
8	oz. bacon.
8	oz. prepared meat and vegetables with salt.
$1\frac{7}{25}$	oz. coffee, with saccharine.

This is still defective in that it contains deficient protein, and it can be remedied by adding more condensed meat to the cartridge, and by making the bacon of the "breakfast" variety containing more meat than that usually supplied. For severe detached service each soldier should have added to this some extract of beef, or beef tablets, and perhaps kola extract, if that article proves useful.

The nutritive value of the above rations cannot be accurately calculated, because the analyses of the preserved meats, soups,

breads etc., are not known. An estimate which is so inaccurate as to be of value only for the comparison shown, is the following table:

	GRAMMES.			Calories	Weight in Ounces Per Day
	Protein	Fats	Carbo Hydrates		
1. English	100	25	70	930?	8 or 12
2. German min.	25	8	148	938	10
max.	46	39	201	1176	12
3. Portugal (unknown)					18
4. Austria	120	100?	200	2250	21
5. Switzerland	134	94	230	2370	21
6. Italian	120	100?	275	2550	22
7. French	148	28	685	3434	37
8. United States (with a patent ration)	100	200	480	3884	33

The Russian and Spanish armies, as far as known, have no reserve or iron ration. The above weights have to be increased by the weights of the boxes and wrappers.

Every European soldier has issued to him in the field from one to four ounces of spirituous stimulant. If it can be carried along when the emergency ration is used, the calories will be increased about 70 calories for every ounce of spirits.

The Selection of a Ration.--The above table shows that while the French emergency ration can take the place of the regular ration, when great exertion is not called for, the German ration cannot. The latter is a pure iron ration. The exact food value of the British ration is unknown, but as before explained it is not intended for prolonged use, and it cannot take the place of the regular food except to bridge over a few hours. It is a poverty ration equivalent to 1 lb. of beef and about three ounces of hard bread. If hard bread is carried, the nutritive value is proportionately increased. The above experimental U. S. ration would contain more protein and less fats if the bacon were of the "breakfast" variety now on the market in little packages wrapped in waxed paper. In the hot southern posts the bacon could be cut down, in the northern ones it could be increased. The Italian and

Austrian emergency rations are simple and intended for but temporary use. They are very convenient. The Austrians apparently have two rations, one for temporary use—an iron ration, and the other an emergency food which can be safely used for a longer time.

It may turn out that we will need two kinds of emergency rations, as the Austrians have. One might be an iron ration something like that of the British, that is some cans containing beef, coffee, or cocoa andhardtack of a total weight of 8 to 16 ounces. This would be issued to every soldier going into the field, and he would not be allowed to consume it without orders from the commanding officer. The other ration would be a full emergency ration, and it could be so designed that it would consist of the iron ration plus other articles (bacon in little packages, soups, hard bread etc.), to be issued only when it is likely that the regular rations will be unattainable. This could be made so that troops could exist on it for prolonged periods. The total weight should not be less than 32 nor more than 48 ounces. The two forms could be entirely distinct if necessary.

If the detached service is to last many days the dried ration will have to be supplemented by lime-juice, raw onions, or potatoes carried along on pack mules. A very small quantity of the fresh juices from these will combat the tendency to scurvy, resulting from almost all dried rations. Lime-juice for such purposes is a regular issue in the British service.

In order to emphasize the fact that emergency rations and iron rations are only to cover unforeseen accidents and delays and are not to take the place of the regular food except in case of detachments on rapid marches, a French writer has stated that if the soldier's supplies are properly kept up he should return from a campaign carrying the identical iron ration issued to him on the first day of his march.

It is impossible to say how long men can be detached with such rations without detriment to health. They have been situated as to have a much more limited diet for several days, weeks or months, and though they have lived and been able to do their duty, such facts do not negative the assumption that it was with considerable damage to health. All discussions of this sort are

very vague, because of our inability to state exactly how much effect the improper diet in war time may have in causing the fearful mortality from camp diseases. Three-fifths of the deaths of Union soldiers in the rebellion were due to disease, and not to wounds. It was far worse among the French in the Crimea. For our purpose here it is sufficient to know that it is probable that soldiers can be detached for the extreme limit of time for which they can carry rations. By placing the ration at its lowest limit, two pounds per day, if men are to be detached five days, it means ten pounds of food to carry at first, or for ten days it means twenty pounds. Any thing over this may be impracticable, but it is to be kept in mind that if an extreme emergency should ever arise, and the commanding general wishes to detach a large body of troops for fifteen or even twenty days, it will be impossible. If they cannot carry more than ten days' rations they might be able to keep in fair condition much longer by reducing the daily allowance. As the extreme limit is invariably calculated upon, we may find that in future wars rapid movements may be made, now thought impossible, just as in the Franco-Prussian war, the erbs-wurst rendered successful movements of troops impossible up to that time.

It is easy to conceive of an army or a large part of it, being thrown rapidly forward to hold a position, and it takes a week or more to make roads so as to get supplies to them. This very thing occurred at Vicksburg, and Grant's men suffered severely from hunger while he was making roads to bring in hardtack. A big store of emergency rations would have been very useful at that time.

For the present ordinary conduct of field movements two days' or even but one day's emergency ration is all that need be carried, but reserve stores at hand will enable this limit to be passed when necessary. If the ration weighs less than two pounds its only use is to sustain for a few hours until the regular ration can be obtained, and it cannot take the place of the regular food for many days. The exact weight and number of emergency rations thus depends upon the purpose in view—short or long period of separation from supplies.

The favorite method of packing "iron rations" abroad, seems

to be in tin boxes. Some preserved vegetables are probably enclosed in paper or paste-board. The German ration bag seems to be made especially for the ration. Its size is given as 12 inches high, 11.7 inches wide, and 1.75 inches deep at top and 3.3 inches deep at bottom.

The total bulk of the German ration as above is about equal to the bulk of one day's French emergency ration or one day's United States field ration. So that the French soldier, having two days' supplies, has double the sized package carried by the Germans.

The proper proportions of protein, fat and carbo-hydrates in an emergency ration in the United States, are quite different from those of European countries. In the first place Americans use a higher percentage of fats than any nation in the world, except those living in arctic countries. This is due to our severe climate. Fats contain two and one-fourth times more energy per pound than carbo-hydrates, and all nations in cold countries instinctively eat fats so as to get as much heat energy as possible in a given weight. Hence, an emergency ration proper for Italy, Spain, Florida or southern California, is not proper for Dakota and Montana. Having found what is proper for the former, it can be made proper for the latter by simply adding bacon. Now the ration needed in idleness in a warm climate contains eighty-five grammes protein. This is needed for necessary repairs. It does not give enough energy, which must be added in fats and carbo-hydrates. In France this is calculated to be as follows:

Prot.	Fat.	Carbo-H.	Calories.
85	50	410	2470

This much is needed for mere existence of an average idle man. As a remarkable coincidence of authorities I might add that in another work I find that the food actually consumed by a woman in Germany doing moderate work was almost exactly in these amounts. Now if the soldier is to do work, as in marching, carrying weights etc., it is calculated that he must increase all the food substances to the following:

Poot.	Fat.	Carbo-H.	Calories.
145	72	610	3745

The more work done the more must these be increased. For instance, in Austria the war ration may be as high as the following:

Prot.	Fat.	Carbo-H.	Calories.
330	260	1008	7904

As we leave France and travel to colder countries, more energy will be needed to make up for increased radiation of heat, and we will find that the fats are increased far more than the carbo-hydrates. The above can then be taken as the least for a full emergency ration in the hotter parts of the country. It cannot be made of less weight than two and one-half pounds, and if of less weight, it will only nourish during times of less activity. It closely approximates the present French emergency ration, but has more fats, less carbo-hydrates and more energy. For every ounce of fat added, two and one-fourth ounces of carbo-hydrates can be deducted, thus saving one and one-fourth ounces in weight. To make the above appropriate for cold climates fats must be added and the calories increased, and the only way to do that in emergency rations is to add bacon. In the ordinary diets we can also add butter and lard. This is one of the reasons why in the field we can eat so much fried food, swimming in grease, and actually like it. The amount of fat added depends on the external temperature, it may even be as high as 300 or 400 grammes.

In reducing the weight of the ration so as to make an "iron ration," the following is the rule: reduce the carbo-hydrates first and most, the fats second and less and the protein last and least. The reasons for the rule are as follows: 1. The carbo-hydrates, being the heaviest fuel, can best be dispensed with. 2. If the fats must also go, then we can still call on the body fats for fuel for a short time, as athletes do in training when reducing the weight. 3. It is necessary to keep up the nutrition of the muscles and other tissues, so that the protein used in repairs (nutrition) must be reduced but little or not at all, even if all the fuel is cut off. In training athletes the proteins are even increased to keep up nutrition. These facts are shown in the estimate of the English emergency ration (see table).

In order to show the above facts graphically the following table

is copied from Bulletin No. 7, of the Storrs School, Agricultural Experimental Station, Storrs, Conn., Sept. 1891, by W. O. Atwater and Chas. D. Woods.

[Nos. 1, 2, 3, 4, 5 and 6 are as proposed by Voit and his followers of the Munich school of physiologists and are based upon observations of quantities actually consumed in a considerable number of cases. Nos. 7 and 8 are by Voit, and based both upon quantities consumed by individuals under experiment and upon observed dietaries of a much larger number of persons in Germany. Nos. 9, 10, and 11 are by Playfair, and are based mainly upon observations of actual dietaries in England. No. 2 is calculated by the writers from the data and results used in Nos. 1 and 3. In Nos. 12, 13, 14, and 15, by one of us (W. O. A.,) the data of Voit, Playfair and other European observers are taken into account, but the conclusions are modified by the results of studies of a considerable number of dietaries of people in the United States.]

STANDARDS FOR DAILY DIETARIES FOR PEOPLE OF DIFFERENT CLASSES.

	NUTRIENTS.			Potential Energy of Nutrients.
	Protein. G	Fat. G	Carbo- hydrates. G	
1. Children, 1 to 2 years, German,	28	37	75	765
2. Children, 2 to 6 years, German,	55	40	200	1420
3. Children, 6 to 15 years, German,	75	43	325	2040
4. Aged woman, German,	80	50	260	1860
5. Aged man, German,	100	68	350	2475
6. Woman at moderate work, German,	92	44	400	2425
7. Man at moderate work, German,	118	56	500	3055
8. Man at hard work, German,	145	100	450	3370
9. Man with moderate exercise, English,	119	51	531	3140
10. Active laborer, English,	156	71	568	3630
11. Hard-worked laborer, English,	185	71	568	3750
12. Woman with light exercise, American,	80	80	300	2300
13. Man with light exercise, American,	100	100	360	2815
14. Man at moderate work, American,	125	125	450	3520
15. Man at hard work, American,	150	150	500	4060

The following table copied from the same pamphlet also illustrates the facts above stated. The remarkable increase of fats in American dietaries must be noted. It will also be noticed that Americans require more food than Europeans.

NUTRIENTS AND POTENTIAL ENERGY IN DIETARIES OF DIFFERENT PEOPLE.

	GRAMMES.			Potential Energy of Nutrients. Cal.
	Protein. G	Fats G	Carbo hydrates. G	
European and Japanese dietaries :				
1. Weaver, England—time of scarcity,	60	28	398	2140
2. Under-fed laborers, Lombardy, Italy,	82	40	362	2190
3. Trappist monk in cloister; very little exercise,	68	11	469	2305
4. Students, Japan,	97	16	438	2345
5. Lawyer, Munich,	80	125	222	2400
6. Cabinetmaker, Leipsic, Germany,	77	57	466	2755
7. Physician, Munich,	131	95	327	2760
8. "Fully-fed" tailors, England,	131	39	525	3055
9. "Well-paid" mechanic, Munich, Germany,	151	54	479	3085
10. Carpenter, Munich, Germany,	131	68	494	3195
11. "Hard-worked" weaver, England,	151	43	622	3570
12. Blacksmith, England,	176	71	667	4115
13. Miners at very severe work, Germany,	133	113	634	4195
14. Brickmakers (Italians at contract work), Munich,	187	117	675	4640
15. Brewery laborer, Munich, very severe work,	223	113	909	5690
16. Mechanics (machinists), Conn.,	105	147	399	3435
17. Glassblowers, East Cambridge, Mass.,	95	132	481	3590
18. French-Canadian working people in Canada,	109	109	527	3620
19. Factory-operators, boarding-house, Mass..	114	150	522	4000
20. Other factory operatives, mechanics, etc., Mass.,	127	186	531	4430
21. French-Canadians, factory operatives, in Mass.,	118	204	549	4630
22. Machinist, Boston, Mass.,	182	254	617	5640
23. College foot-ball team, food eaten,	181	292	557	5740
24. Teamsters, marble-workers, etc., with hard work, Mass.,	252	363	826	7805
25. Brickmakers, Mass.,	180	365	1150	8850

The medical officer will have a supply of partially or entirely digested condensed foods for exhausted soldiers. Such articles will be considered as valuable as ammunition, and carried along with each detached body of troops. They are also emergency rations, but as they come in another sphere they are not enlarged upon here. Among the chief of these are the preparations made

by Reed & Carnrick, 124 So. 5th Ave., New York (Kumysgen and Soluble Food for Invalids). Numerous others are on the market. The compressed soups, beef extracts, prepared beef, etc., if kept at the field hospital, or dressing stations would also save many a wounded soldier's life. Somatose, the last of these preparations, is probably the best.

The great difficulty with prepared emergency foods is the fact that we are dependent upon private enterprise. If a man invents a preparation he must, in order to get it into use, supply immense quantities for trial, and often receives no return. Nothing of this sort can be adopted in any army without giving it extended trials. Now, all this costs money, and much money has been lost by private firms in such work, and a few have been ruined. It seems only fair that as the nation at large is the one to profit by these experiments, it should foot the bills. This can best be done by making these articles at government arsenals, continually experimenting and giving trials to the best, until something really satisfactory is evolved from the mass of partially successful things now on the market. In time of war the commissary department may have to do this work, as the Germans did in 1870, and are still doing, if it is proved that private contractors cannot be trusted, or if methods of preparation are to be kept secret. If no suitable buildings nor machinery can be obtained, we will have to depend on the products of private makers.

Italy, Russia and Germany are all said to have government factories for preparing meats for troops in the field. One method of preparing beef in bulk is said to be as follows: It is first boiled a very short time, then dried, salted and packed in straw and shipped by rail. This is no doubt abandoned in favor of cold storage. If the company fund would permit, I should unhesitatingly advise that each company commander should buy a sufficient quantity of some one of the compressed soups or rations containing meat (not the extract) and should keep them on hand for sudden field service. If, after a few months, it is feared that there is danger of spoiling, a new supply could be purchased and the old ones used in garrison. Indeed, some of these soups would be a

pleasant addition to a garrison ration at any time. Beyond this it is impossible to go until an official emergency ration is adopted and issued. Even this small beginning would have been greatly appreciated by some of the companies during the strike last summer. For a small mess, such as that of a few officers, almost everything we have considered is of value from the convenience, ease of carrying and variety of diet when fresh articles are not available. As a final word, let it be understood that fresh articles of food are to be obtained whenever it is possible; prepared foods cannot replace the fresh.

A perfect ration cannot be designed at present, but as the experience of the last twenty-five years shows, there is a gradual but decided improvement. Hence any ration proposed can be regarded only as a temporary expedient to be discarded as soon as better things are devised. There must be constant experiments and reports if we are to reach something really serviceable and reliable. In the next twenty-five years we should have as many different rations, each better than its predecessor.

There are innumerable brands of canned meats, fruits, vegetables, soups etc., which are in daily use throughout the world. They all contain water and are therefore too heavy for emergency foods, but they are excellent for field service where there is likely to be difficulty in getting fresh articles. Unfortunately they are not available for the soldier's official supplies, on account of cost, and other reasons, but they are excellent for small officer's messes, or for small bodies of National Guard troops on short service such as riots, etc. Though these articles are somewhat foreign to the scope of this paper, they are emergency foods in a theoretical sense as previously explained, being substitutes for the regular ration of fresh foods. They might be called campaign foods or field rations, and foreign armies find them indispensable in the absence of fresh supplies. The French are said to keep huge stores of them in Paris.

It would be an interminable task even to mention the host of manufacturing firms engaged in this business. It might be well to mention a few of these firms, among whom there might be some who could devise and present for trial, varieties of condensed rations suitable for our service. If such foods are adopted

it is absolutely essential that they be made in the United States, and at such points that there would not be even a remote chance of their being interfered with by the enemy in case we should ever be so unfortunate as to become at war with our neighbors.

The Fairbank Canning Company, Union Stockyards, Chicago, Ill., puts up beef in cans for foreign armies. The beef is either boiled, roasted or corned, and though it is an excellent article for field use to take the place of fresh beef when the latter is not available, it is unsuitable for emergency rations as above mentioned. The following preparations are on the market: 1. Fresh boiled beef in $2\frac{1}{2}$ lb. net cans, kidney shaped and arranged to fit on the strap of the haversack. The French use this form. 2. Fresh boiled and roast beef in 1 lb. net round cans. 3. Corned beef in 12 oz. square cans. 4. Fresh boiled and roast beef in 200 grammes net cans.

As far as I have been informed I have been particularly impressed with the excellence of the soups and other preparations of the Franco-American Food Co., Franklin street and West Broadway, New York. Other firms highly recommended are: The National Pure Food Co., Cincinnati; Sprague, Warner & Co., Chicago; Curtice Brothers, Rochester, New York (preserves etc.); Burnham, Marrall & Co., Portland, Me. (baked beans).

Such Chicago packing firms as Swift's or Armour's have a plant sufficient to prepare any number of condensed meats for the largest army we will ever require.

Every article of food mentioned in this paper should really be kept for sale by the Exchange or Commis. Dept. for the convenience of officers or soldiers going into the field. By this encouragement they would be extensively tried, and we would very quickly discard the things found unsuitable. This is the system in vogue in the British army. Losses from spoiled articles would be small as none of them spoil easily except compressed coffee, but losses would fall where they would do no harm.

For much information in this paper I am indebted to the courtesy of Capt. Henry G. Sharpe, A. C. S., U. S. Army; Lieut. W. C. Brown, 1 Cav., U. S. Army; Mr. E. C. Hazard (E. C.

Hazard & Co., Importers of Groceries, 117 Hudson St., N. Y.), President of the Food Manufacturers' Associa'n; Mr. Geo. B. Howard (33 St. George's House, Eastcheap, London) the London member of the export and commission firm of Thurber, Howard & Co., Room C, export Produce Exchange, N. Y., and to the various manufacturers mentioned throughout the paper who have also kindly furnished samples.

Additional information has been taken from the below-mentioned papers. Two articles by the writer, "The U. S. Army Ration," in the Journal of the American Medical Association, Dec. 3, 1892, and "Military Food," in the Journal of the U. S. Cavalry Association, is found in the Army and Navy Register, May 11 and 25, 1895. Papers and reports on Emergency Food by Major Charles Smart, Surgeon, U. S. Army, and Major Wm. Ludlow, U.S. Engineers, are found in the Army and Navy Register, June 1, 1895. Capt. Henry G. Sharpe, A. C. S., U. S. Army, 34 Olive street, St. Louis, Mo., has in preparation a complete paper on this subject.

Since the above was written a board of officers in Washington has gone over the whole subject and as a result of their investigations, the following order has just been published by the War Department:

GENERAL ORDERS, } HEADQUARTERS OF THE ARMY,
No. 49. } ADJUTANT GENERAL'S OFFICE,
 } *Washington, December 5, 1896.*

1. The following order has been received from the War Department:

WAR DEPARTMENT, *Washington, December 5, 1896.*

Under the authority vested in him by section 1146, Revised Statutes, the President hereby establishes an emergency ration for troops operating for short periods under circumstances which require them to depend upon supplies carried upon their persons. Its component parts are as follows: Bacon, 10 ounces; hard bread, 16 ounces; pea-meal, 4 ounces, or an equivalent in approved material for making soup; coffee, roasted and ground, 2 ounces, or tea, $\frac{1}{2}$ ounce; saccharin, 4 grains; salt, .64 ounce; pepper, .04 ounce; tobacco, $\frac{1}{2}$ ounce.

DANIEL S. LAMONT,
Secretary of War.

2. The Secretary of War directs that this emergency ration be resorted to only on occasions arising in active operations when

the use of the regularly established ration may be impracticable; that, although its nutritive qualities permit its use on half allowance, it will not be so used except in cases of overruling necessity, and never for a longer period than ten days; and that not more than five days' emergency rations be carried on the person at one time.

3. By direction of the Secretary of War, the Subsistence Department will provide tough paraffine paper for wrapping the bacon; will furnish hard bread in grease-proof packages, the peameal in cylindrical packages, and the coffee, tea, saccharin, salt, pepper, and tobacco in suitable packages.

BY COMMAND OF MAJOR GENERAL MILES:

GEO. D. RUGGLES,

Adjutant General.

NOTES ON AN EMERGENCY RATION.

BY CAPTAIN LOUIS A. LAGARDE, Assistant Surgeon, U. S. Army.

The following notes on the use of an emergency ration in active field service are based on a special report to the Adjutant General, Department of the Colorado, at Denver, Colo., September 17th, 1895.

The necessity for a compact ration to be issued to troops under certain conditions of active service, where transportation is limited, has long been apparent to the armies of all nations. Various combinations of food products, which taken altogether embodied the necessary elements to subsist and maintain the individual during moments of hardship and endurance have been tried. It may be stated that the rations resorted to by the different nations for emergent reasons differ more or less, and that in some instances they are very dissimilar. The reason for this is of interest in a dietetic and physiological sense. It would seem that the emergency ration of the French or German or English might, under similar conditions of climate and general environment, be suitable for the American soldier, and yet the fact that our government is at present trying to solve a suitable emergency ration for its army, shows that the rations of the different nations mentioned are not entirely sufficient or desirable for the American.

I was appointed a member of a board, which convened at Fort Logan, Colo., during the summer of 1895, whose business it was to consider the subject of an emergency ration for our army. The board labored during three weeks in its endeavors to put together a compact dietary, which might be acceptable to the American soldier, and, at the same time, subsist him during certain conditions of war.

The board, in its summing up, recommended the following articles to form an emergency ration:—three coffee tablets, one bean soup tablet, three whole wheat-meal crackers, and $\frac{3}{4}$ lb. bacon.

"*The coffee tablet*, weight two drachms, composed of a solid extract, prepared by Parke, Davis & Co., of Detroit, containing a small amount of saccharine instead of sugar. The coffee in the field was prepared by dissolving the tablet in a pint of water, bringing the latter to the boiling point for a few minutes, allowed to cool."

"*The bean soup tablet* weighed 2 oz., composed of a consolidated preparation of dried bean and, possibly, other ingredients unknown to the board, prepared by the California Dessicated Food Co. The soup was prepared by breaking up the tablet in a cup and adding warm or cold water in small quantities until the mixture measured a quart. The soup was then placed on the fire and allowed to boil 15 or 20 minutes, stirring all the while, seasoned to taste, and served."

The crackers were each supposed to weigh $4\frac{1}{2}$ oz., although the size and weight were found to differ materially in all the rations submitted for trial. The cracker was composed of the whole wheat grain, compressed and cooked, to be eaten dry or broken in the soup or coffee.

The bacon ration weighed $\frac{3}{4}$ lb., put up in tins by the Armour Packing Co. The tin and contents weighed 17 oz. Each can was provided with a key, which permitted a ready method of exposing the contents.

On September 10th, 1895, I was ordered to take the field from Fort Logan, Colo., with Company "H," 7th U. S. Infantry, commanded by Captain George S. Young, the strength of the command being four officers and fifty-five enlisted men, for the purpose of testing the emergency ration above noted. The command was provided with five days' rations and left the post September 10th, as stated, and, after marching a distance of ten miles, went into camp at 10 A. M. on Turkey Creek.

I should state, before going further, that I had no knowledge, while I was a member of the emergency board, that I should ever be called upon to test the ration, which I, as a member of the board, might recommend. When, therefore, I was ordered to

take the field to test the ration, for the first time, after an experience of twenty-three years in the art of prescribing, I found myself confronted with the necessity of taking the very dose I had dictated for others. I believe that the members of the command and the field notes of that expedition rendered to the Adjutant General will testify to the fact that I took my medicine like a man.

Shortly after our arrival in camp the men were ordered to prepare their lunch, which was to consist of soup, coffee and a whole wheat cracker, prepared according to the directions. They were further told that the remainder of the ration, the bacon, two coffee tablets and the two remaining whole wheat crackers should be equally divided for the two ensuing meals, viz: supper and breakfast. The officers and men fared alike, each was his own cook and dishwasher. At 2 P. M. one of the officers and several of the men complained of nausea and vomiting as well as diarrhea at times. At 4 P. M. the cases of sickness reported were so numerous and the patients were so much scattered on hill tops, along the bed of the creek and among the rocks, that the capacity of the Medical Department was seriously threatened. The consternation of a few moments was abruptly ended by the timely notes of "sick call" from the bugle of the orderly trumpeter.

After the lapse of probably 30 minutes the sick and distressed, 36 in all, had been gathered, squatting in a semicircle on the ground, near the headquarter tents. Each man was interrogated as to the food and water he had taken during the day. The fact that four of the sick had not tasted water, except the Fort Logan water contained in their canteens, served to exclude the camp water as a possible factor in bringing about the sickness. The possible cause was then reduced to the coffee, soup or whole wheat cracker. Minute inquiries from those who had partaken of this portion of the ration in very sparing quantity, soon revealed the cause to lie most likely in the soup, and, to a certain extent, in the cracker. For instance, some of the men, who had partaken of no coffee and who had taken but a small fragment of the bread and liberally of the soup, suffered, whilst others who, vice versa, had taken coffee, all of the wheat cracker and but little of the soup, suffered as well. The judgment of the sufferers as to

the probable cause of their suffering was divided between the soup and the whole wheat bread, with the preponderance of opinion for the soup as the greater mischief-maker. A number of the men complained of a severe pain under the short ribs with a sense of oppression in breathing due, they said, to expansion of the stomach from the swelling of the bread. One of the remarkable clinical features of these cases was that a sick man was relieved as soon as vomiting occurred, with a little or no after effect.

The facts, as related above, were communicated by the Commanding Officer to Headquarters at Fort Logan, Colo. Bread being such an important part of the ration, and the men having become too much prejudiced against any further use of the tasteless cracker, it was suggested that, if it should be the wish of the authorities to test the ration further, that hard bread be sent to last the command the next three days.

On the following morning, September 11th, the invoice of hardtack having been received during the night, the men partook of their breakfast of bacon, coffee and hardtack with no apparent ill effects. Lunch at 11:30 A. M. consisted of coffee, hardtack and what bacon was left from the morning meal. A few of the men dared to eat the soup, 50% of whom suffered as observed the day before. At 12 M. the command broke camp and marched to Bear Creek, a distance of 12 miles. The ascent over the mountains was very steep, and the physical and mental depression incident to the sickness of the previous day made the march dull and irksome. As shown by the field notes, the necessity of excusing men on account of exhaustion, lassitude, diarrhea etc., was experienced a number of times. For supper in the camp at Bear Creek I suggested to the Commanding Officer that the cause of the difficulty with the soup might be in the use of a whole tablet to one quart of water. The order was given to the command that those who chose to try the soup, might do so in half the strength, that is, by dissolving a half tablet in a quart of water according to directions. Captain Young and I were among those who volunteered to try the soup in this diluted form. We were both nauseated in the course of time, and Captain Young was seized with vomiting and diarrhea during the night. No notes were taken of those who took the diluted soup among the

men. It is probable that only a very small number resorted to it.

September 12th, for breakfast, the command subsisted on bacon, coffee, and hardtack. At noon, after a march of eight miles, fourteen of the men, Lieutenant Sargent and myself agreed to make our lunch principally of soup diluted one-half. Lieut. Sargent, who happened to be among the victims on the first day out, suffered no inconvenience. I was again nauseated and it was by the exercise of the greatest will power that I did not vomit. Of the fourteen volunteers among the men, who subsisted likewise, seven were nauseated.

September 13th, the command breakfasted on bacon, hardtack, and coffee. The aversion to the soup had by this time become very general, nearly 80% of the command had been weakened and otherwise distressed by this article of the ration, and since the ration as a whole had been tested to the satisfaction of all concerned, upon my recommendation, the Commanding Officer marched his command into Fort Logan, a distance of ten miles, reaching the post at 10 A. M. September 13th.

CONCLUSIONS.

Coffee.—The coffee tablet served the purpose of furnishing a cup of hot coffee with, we may state, no cost of time or trouble. It might be improved by adding more sweetening and more coffee.

It has often occurred to me that tea, compressed, if desired, into tablets, might be advantageously substituted for coffee in emergency rations. The element of weight certainly favors its use, and, besides, it may be confidently stated that a cup of good tea can be made almost invariably in the field, whereas it is seldom one succeeds in making a good cup of coffee under like circumstances. We are informed by the manufacturers of the coffee tablet that its keeping qualities cannot be recommended. This will go far against the adoption of coffee in tablet form in the emergency ration. Such an objection cannot be raised against tea, and this is one more reason for its use in the emergencies of field service. The physiological and dietetic uses of coffee and tea are so nearly identical that no preference can be given to the one or the other on these grounds. There is good reason to believe that much of

our failure to use tea as a beverage in this country is born of a national prejudice incident to the days of the Boston Tea Party.

Concentrated Bean Soup.—Notwithstanding the drawbacks attending the use of the bean soup tablet, I am inclined to still favor the use of a concentrated soup of some kind. Tablets of pea soup submitted for trial by the board made a more savory soup than that made from the concentrated bean. The latter imparts the taste and smell of flax-seed to the soup, and this renders it rather nauseating in itself. The manufacturers can testify more correctly upon the keeping qualities of tablets made from either pea or bean. If concentrated pea soup should be shown to have better keeping qualities, this would be an additional reason for its use. I believe that the cause of sickness after the use of the concentrated bean soup was primarily due to fermentation with the liberation of ptomaines whilst the ingredients were in tablet form. The distinct chain of gastro-intestinal symptoms, which ceased as speedily as the stomach and bowels were emptied, goes far to substantiate this view. This experiment suggests the value of extreme caution in selecting these concentrated foods for issue to the troops.

Bacon.—Two of the rations of bacon were found rancid when the tins were opened. The value or necessity of putting the meat ration in cans is questionable. Bacon put up in canvas like breakfast bacon or ham, in quantities to include three to five rations, might be kept for issue with a fair certainty of keeping for a few months. Such a package could be more conveniently packed in the equipment and more easily handled by the soldier. The chipped beef so satisfactorily furnished by the packers now days, would be a valuable addition to the meat ration.

Bread.—The whole wheat crackers furnished were not used by the men, and properly so. There is nothing in either their taste or appearance to tempt the appetite of even a hungry man. The value of the whole-wheat flour over the finest flour, in which all bran has been removed, is based on the small amount of nitrogen, salt and fat, which the former contains over the latter. Chemically speaking this is true, but in a dietetic sense the proposition is absurd. The bran of the whole-meal bread is not absorbed and its contained nitrogen is not assimilated. The value,

therefore, of loading the intestine with this bulky waste is very questionable. We know on the other hand that the irritation caused by the hard envelope of the wheat-grain is productive of most intractable dysenteries. I can conceive the value of well ground whole-wheat flour for one meal in the day on account of the mechanical influence it is apt to exert on the peristalsis of the intestine, thus securing a motion of the bowels as an irritant, and I can for the same reason see the injury which might result from the over-irritation of the intestine in those who might resort exclusively to a bread made from such a flour. I must confess that I agreed to recommend the whole wheat cracker with the greatest reluctance, for the very reasons mentioned herein. In my opinion we are not yet acquainted with a better bread thanhardtack for the field.

THE VIABILITY OF THE CHOLERA SPIRILLUM IN ITS RELATION TO CERTAIN FRUIT ACIDS.*

By LIEUTENANT THOMAS C. CRAIG, Surgeon, U. S. Navy.

All acids exert an inhibitory action on the growth of the cholera spirillum; all mineral acids—if sufficiently concentrated—will destroy its vitality; the fruit acids will in like manner destroy the vitality of this spirillum, provided they be concentrated. Most of our fruits are acid in reaction, the acidity varying with the kind and ripeness. In selecting the fruits for the following experiments, due regard was exercised to procure those which represented the actual normal condition in which they would be found in the markets and in which they would be placed on our tables. For example, over-ripe or under-ripe fruits were avoided. This was done in order to procure those in which there would be about the natural acidity present, which to our sense of taste would designate the fruit as ripe. Pure cultures of the cholera spirillum were used, and in the different manipulations care was taken to prevent contaminations of the cultures and inoculations. The incubating was protected from the light, in order to remove the deleterious influence of sun-light, which we know is in itself inhibitory to the growth of the cholera spirillum. Dessication was obviated by the natural moisture of the fruits. The fruits selected were those commonly found in the markets during the summer months. The point to determine was, how long a good active growth of the cholera spirillum would live in contact with the cut surface of these fruits. Thus it was determined to try and arrive at the length of time it would take these weak fruit

*A series of original experiments, conducted at the Hoagland Laboratory of Bacteriology, Brooklyn, N. Y.

acids to render the cholera spirillum no longer able to propagate itself.

This becomes a very important question, for we well know that water is almost the sole means by which this pathogenic bacterium is conveyed; hence it is by infected water, which, having been brought in contact with the fruits, deposits the bacteria on them, that the fruits often become the means of conveying the infection.

The cholera spirillum will overcome, or in other words resist the acidity of some fruits for a very long while. The cholera spirillum will only grow in an alkaline medium. It may be that the cholera spirillum is able to produce enough of some alkaline substance to neutralize a very weak fruit acid and thus render its surroundings suitable for its own propagation.

The technique which was carried out was the same with all the fruits. Fresh cultures of the cholera spirillum were made in each case. Before inoculating the cut surface of the fruits, controls were made, and these controls were incubated under the same conditions that the inoculations were. The inoculated fruits were always placed in a dark closet, and as these experiments were carried on in the summer months it was judged that the ordinary room temperatures were sufficient. Indeed, this was the temperature that the fruits would ordinarily meet with in our markets during the fruit season, and hence would be the condition under which the cholera spirillum would either live or die. The knife used for making the sections, the forceps necessary to hold the fruit, the pipette with which the cholera culture was transferred to the cut surface of the fruit, were all made perfectly sterile each time, before using, by passing them through the flame of a Bunsen burner. The bacteria dishes were always exposed for one hour to a temperature of hundred and fifty degrees centigrade, before the cut sections of the fruit were placed in them.

On May 16, 1895, a peptone solution culture medium was inoculated with a pure culture of the cholera spirillum—procured in 1892, by the director of the Hoagland laboratory, from cholera cases at Swinburne Island in New York harbor. Placed inoculated tube in incubator, sterilized a bacteria dish at 150 degrees centigrade for one hour.

APPLE.

May 18th—The first fruit selected for experiment was the apple. Although late in the season for this particular fruit, I was fortunate in procuring a fine specimen; a large juicy one, with a slightly acid taste. Prepared section of the apple by slicing with a sterilized knife, and placed it in the sterilized bacteria dish. Tested reaction of cut surface of apple and found it to be strongly acid. Made mount from the cholera culture of the 16th inst., (two days old), and found plenty of the spirilla of cholera and the comma forms. Inoculated a tube of peptone solution with a small piece of the apple to act as control, and placed tube in the incubator. Inoculated the section of the apple with the cholera culture, placing sterile tacks around the inoculated area, in order that I could again find it.

I am aware that Dr. Bolton has demonstrated, by experiment, that certain metals will inhibit the growth of bacteria in their immediate neighborhood. In my experiment, I placed the tacks at some distance from the inoculated area, and further, in another series of experiments, I obtained the same results where the infected area was marked out by scratching on the surface of the cut fruit. At the end of thirty minutes, one and two hours respectively, I inoculated peptone solution from the area before planted with the cholera culture, and placed tubes in the incubator. The dark closet, in which the infected fruit was placed, had a temperature of about 80 degrees Fah.; indeed this temperature did not vary more than five or ten degrees in any of these experiments.

May 21st.—The control tube did not show any growth. All the other tubes showed growth; a mount made from each one showed the cholera spirillum, and acid added to each one gave the cholera red reaction.

May 30th.—Similar inoculations, into peptone solution, were made from the infected area on May 23, 25, 28 and 29. All these inoculations, except the one made on the 29th, showed growth; a mount from each one showed the cholera spirillum, and acid added to each one gave the cholera red reaction. The tube inoculated on the 29th did not show any growth. This experiment proved that

the cholera spirillum lived ten days after being planted on the sterile cut surface of this apple; *i. e.* the fruit acid of the apple was resisted for that length of time. The spirillum died out on the eleventh day.

BANANA.

May 18th.—The next fruit taken was the banana. Removed the skin and sliced the banana with a sterilized knife and placed the cut sections in a sterilized bacteria dish, mapping out areas on the slices with sterilized tacks, as was previously done on the apple. Planted a fresh culture of the cholera spirillum in the areas mapped out. Tested surface of banana, and found it to be slightly acid. Inoculated a tube of peptone solution with a small piece of the banana as a control. At the end of thirty minutes, and of one hour, and also on the 21st, 23d, and 25th instants, respectively, made inoculations into peptone solution from the infected area of the fruit, and placed tubes in the incubator, and the infected fruit in a dark closet.

May 26th.—The control tube did not show any growth. All the other tubes showed growth, except the tube inoculated on the 25th instant, it remaining perfectly clear. A mount made from each one of the other tubes showed the cholera spirillum, and acid added to each one gave the cholera red reaction. This experiment showed that the cholera spirillum lived in contact with the cut surface of this fruit for five days; dying out on the sixth day. The cholera spirillum had, therefore, resisted the acidity of this fruit for five days.

STRAWBERRY.

May 25th.—The next fruit experimented with was a strawberry. Sliced fruit with a sterilized knife, and placed section in a sterilized bacteria dish. Made control inoculation, into peptone solution, of a portion of the pulp of the cut section. Tested reaction of the cut surface of fruit, and found it to be strongly acid. Inoculated cut surface of fruit with fresh culture of the cholera spirillum. At the end of thirty minutes and of one hour, and also at the end of twenty-four hours, made inoculations into peptone solution from the infected area of the fruit. Placed infected fruit into dark closet, and inoculated tubes in the incubator.

May 27th.—The control tube did not show any growth; all the other tubes showed growth, except the one inoculated at the end of twenty-four hours, which remained perfectly clear. A mount made from each tube which showed growth showed the cholera spirillum, and acid added to each one gave the cholera red reaction. This experiment showed that the cholera spirillum lived for one hour, but did not live twenty-four hours in contact with the cut surface of this fruit. It was unable to resist the acidity of this fruit for twenty-four hours.

PINEAPPLE.

June 15th.—The next fruit selected was the pineapple. Sliced fruit with a sterilized knife, and placed section in a sterilized bacteria dish. Tested reaction of cut surface of the fruit, and found it to be weakly acid. Placed a small piece from the cut surface of the fruit into a peptone solution to act as a control. Inoculated cut surface of fruit with a fresh culture of the cholera spirillum, and placed bacteria dish in dark closet. Placed control tube in incubator.

June 16th.—Control tube did not show any growth. Inoculated peptone solution, from the infected area of the fruit, and placed tube in incubator.

June 17th.—Tube did not show any growth, thus showing that the cholera spirillum had died out within the first twenty-four hours. The surface of this fruit, although weakly acid, proved to be a poor culture field for this spirillum, it not being able to resist this weak acid one day.

APRICOT.

The next fruit chosen was the apricot. June 15th.—Sliced fruit with a sterile knife, and placed section in a sterilized bacteria dish. Tested a reaction of cut surface of fruit, and found it to be feebly acid. Placed a small piece from cut section of the fruit in peptone solution, to act as a control. Inoculated cut surface of fruit with a fresh culture of the cholera spirillum, and placed bacteria dish in dark closet. Placed control tube in incubator.

June 16th.—Control tube did not show any growth, but remained perfectly clear. Made inoculations into peptone solu-

tion, from the infected area of the fruit, on the 16th, 17th, and 18th instants, and placed tubes in incubator.

June 19th.—Inoculations showed the following: The ones made on the 16th and 17th showed growth, mounts made from them showed the cholera spirillum, and acid added to each one gave the cholera red reaction. The inoculation made on the 18th did not show any growth, but remained perfectly clear. This experiment proved that the cholera spirillum had been able to resist this fruit acid forty-eight hours, but not seventy-two hours.

ORANGE (SOUR).

The next fruit experimented with was an orange. June 20th.—This fruit was what is commonly known as a sour orange. Sliced fruit with a sterilized knife, and placed section in a sterilized bacteria dish. Tested reaction of the cut surface of the fruit, and found it to be strongly acid. Placed a small piece from the cut surface of the fruit in peptone solution, to act as a control. Inoculated the cut surface of the fruit with a fresh culture of the cholera spirillum. Made inoculations into peptone solution from the infected area of the cut surface of the fruit, at intervals of five, ten, fifteen, twenty and thirty minutes, and also at the end of one hour. Placed bacteria dish, containing the section of the infected fruit, in a dark closet, and the inoculated and the control tubes in incubator.

June 21st.—The tubes showed the following results: The control tube did not show any growth, but remained perfectly clear. The inoculation made at the end of five minutes showed growth, a mount showed the cholera spirillum, and acid gave the cholera red reaction. The tubes inoculated at the end of ten, fifteen, twenty and thirty minutes, and at the end of one hour did not show any growth, they all remained perfectly clear. This experiment showed that the cholera spirillum lived for five minutes in contact with the cut surface of this fruit, but that it was not able to withstand the fruit acid for ten minutes, it dying out between five and ten minutes after contact. As this specimen of orange was a seemingly very acid one, it was determined to obtain a sweet Florida orange, and repeat the experiment on it.

ORANGE (SWEET FLORIDA).

June 25th.—Procured a sweet Florida orange, sliced it with a sterilized knife, and placed the section in a sterilized bacteria dish. Tested reaction of the cut surface of the fruit and found it to be decidedly acid. Teased a small piece from the cut section in the bacteria dish and inoculated it into peptone solution to act as a control. Inoculated the cut surface of the fruit, in the bacteria dish, with a fresh culture of the cholera spirillum. Made inoculation into a peptone solution from the infected surface of the fruit at the end of five, ten, fifteen, twenty and thirty minutes, and at the end of one, two, and three hours. Placed inoculated orange in a dark closet, and the inoculated tubes in the incubator.

June 26th.—The inoculated tubes gave the following results. The control tube did not show any growth, but remained perfectly clear. The inoculations made at the end of five, ten, fifteen, twenty and thirty minutes showed growth, a mount made from each one showing the cholera spirillum, and acid added to each one showing the cholera red reaction. The inoculations made at the end of one, two and three hours did not show any growth, but remained perfectly clear. This experiment showed that the cholera spirillum lived for thirty minutes, but not for one hour, in contact with the cut surface of this orange. In other words it resisted the acid of this fruit for thirty minutes.

I might mention here that this second experiment with the orange was made in order to see the relative effect of what is called a more or less sour orange, with what is pronounced to be a very sweet orange. The point being this:—does the sour orange contain more acid than the sweet one, or do they both contain about the same amount of acid—the acid in the sweet one being masked by sugar? If this latter had been the case, we would have expected the cholera spirillum to have died out in the same time it did on the sour orange. The result of the experiment will bear me out in the fact, that the very acid, or sour oranges, are much more fatal to the cholera spirillum than the sweet ones.

LEMON.

June 25th.—The next fruit selected was the ordinary lemon. Made a section of the fruit with a sterilized knife, and placed the

section in a sterilized bacteria dish. Tested the reaction of the cut surface of the fruit, and found it to be strongly acid. Teased off a small piece from the section in the bacteria dish, and placed it in a peptone solution, to act as a control. Inoculated the cut surface of the section, in the bacteria dish, with a fresh culture of the cholera spirillum. Made inoculations into peptone solution from the infected surface of the fruit at the end of five, ten, fifteen, twenty and thirty minutes, and at the end of one hour. Placed bacteria dish in a dark closet, and the inoculated tubes in the incubator.

June 21st.—Neither the control tube nor the inoculations made at the end of five, ten, fifteen, twenty and thirty minutes, and at the end of one hour, showed any growth; they all remained perfectly clear.

This experiment showed that the cholera spirillum died out before the end of five minutes, after contact with the cut surface of this fruit. In this case the cholera spirillum was not able to withstand the acid of this fruit for five minutes.

WATERMELON.

The next fruit taken was the watermelon. June 25th.—Made section of the watermelon with a sterilized knife, and placed section in a sterilized bacteria dish. Tested reaction of the cut surface of the fruit, and found it to be faintly acid. Removed a small piece of the cut section, in the bacteria dish, and placed it in peptone solution to act as a control. Inoculated the section of fruit, in bacteria dish, with a fresh culture of the cholera spirillum. Made inoculations into peptone solution from the infected area of the fruit, at the end of five, ten, fifteen, twenty and thirty minutes, and at the end of one, two and three hours, and on the following dates: June 26, 27, 28, 29, July 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 15, 18, 21, 24, 27, 31, and August 3, 6, 7. All of these inoculations, except the control tube, showed growth, a mount from each one showing the cholera spirillum, and acid added to each one giving the cholera red reaction. At this stage, in this experiment, the inoculated watermelon had so far disintegrated and softened, that there was scarcely anything of it left, except a pulpy mass; so the experiment was discontinued.

The results obtained showed that the cholera spirillum had lived for forty-two days in contact with the cut surface of this water-melon, and that, when the experiment was abandoned, the cholera spirillum was yet in an active state. Perhaps it would have lived many more weeks, had not conditions arisen which rendered further experimentation inexpedient.

CANTALOUP.

The next fruit selected was a cantaloupe. August 17th.—Procured a medium ripe cantaloupe, and prepared a section of it with a sterilized knife and placed the section in a sterilized bacteria dish. Tested reaction of the cut surface of the fruit, and found it to be faintly acid. Removed a small piece from the cut section in the bacteria dish, and inoculated it into a peptone solution, to act as a control. Inoculated the cut surface of the fruit in the bacteria dish with a fresh culture of the cholera spirillum, and placed bacteria dish, containing the infected fruit, in a dark closet, and the control tube in the incubator.

August 18th.—The control tube did not show any growth, but remained perfectly clear. Inoculated peptone solution from the infected area of the fruit on the following days, and placed the tubes in the incubator: August 18, 20, 22, 24, 26, 28, 31, and September 1. All these tubes showed growth, a mount made from each one showed the cholera spirillum, and acid added to each one gave the cholera red reaction. The specimen of cantaloupe had, by this time, softened to a pultaceous mass, covering the bottom of the bacteria dish; so the experiment was discontinued. The result showed that the cholera spirillum had lived for fourteen days in contact with the cut surface of this cantaloupe, and had not the fruit disintegrated the experiment might have shown the almost indefinite growth of this spirillum; for there were present, in this experiment, many favorable factors conducive to the growth of this particular bacterium, viz: heat, moisture, and above all, little or no acidity.

I was very anxious to repeat this experiment, for the conditions were so favorable to the growth of the cholera spirillum, until the cantaloupe became a pultaceous mass. In order to obviate this I procured a second cantaloupe, slightly less ripe than the first one.

Prepared and sterilized a bacteria dish, and made a section of the cantaloupe, with a sterilized knife, and placed the section in the sterilized bacteria dish. I then inoculated a peptone solution, from cut surface of the section of the fruit contained in the bacteria dish, in order to act as a control, and placed it in the incubator. Tested reaction of the cut surface of the cantaloupe, and found it to be faintly acid. Inoculated the cut section of the fruit, in the bacteria dish, with a fresh culture of the cholera spirillum, and placed it in a dark closet. I did not disturb this inoculated specimen for two weeks, as I felt sure that the cholera spirillum would live as long on this second specimen, as it did on the first one, for the reason that the conditions were precisely similar. At the end of the two weeks I found that this second specimen had also disintegrated into a pultaceous mass, just as the first specimen had. No further trials were made with this fruit. I should have mentioned that the control tube, in this second specimen, did not show any growth.

PEACH.

The next, and last fruit selected, in this series of experiments, was the peach. August 17th.—Procured a ripe peach, and made a section of it with a sterilized knife, and placed the section in a sterilized bacteria dish. The section of the peach had the skin removed, and was not cut deep enough to reach the stone. This was done in order to avoid any bacterial contamination, which might have penetrated to the stone through the wound made when the peach was detached from the stem; for it is a common occurrence to find bacterial growths, even in the seed of the peach stone. Tasted reaction of the cut surface of the peach and found it to be acid. Made inoculation into peptone solution from the cut surface of the section of the peach in the bacteria dish, to act as a control, and placed tube in the incubator. Inoculated the section of the fruit, in the bacteria dish, with a fresh culture of the cholera spirillum, and placed dish in a dark closet.

August 18th.—The control tube did not show any growth, but remained perfectly clear. Made inoculations into peptone solution from the infected area of the cut surface of the peach on the following dates, August 18, 19 and 20, and placed tubes in incubator.

All of these inoculations showed growth, except the one made last, which remained perfectly clear; a mount made from each one of the other tubes showed the cholera spirillum, and acid added to each one gave the cholera red reaction.

This experiment showed that the cholera spirillum had lived over twenty-four hours in contact with the cut surface of this peach; but that it did not live for forty-eight hours. In other words the cholera spirillum had resisted the acid of this fruit for more than twenty-four hours, but less than forty-eight hours.

In summing up this series of experiments the following data are deduced: A fresh active culture of the cholera spirillum lived in contact with the cut surface of these fruits as follows:

Apple, ten days.

Banana, five days.

Strawberry, one hour.

Pineapple, less than twenty-four hours.

Orange, (sour), five minutes.

Orange, (sweet Florida), thirty minutes.

Lemon, less than five minutes.

Watermelon, more than forty-two days.

Cantaloupe, more than fourteen days.

Peach, twenty-four hours.

Apricot, forty-eight hours.

There was one difficulty I had to contend with in the case of the strawberry, viz: the moulds. When it is remembered that the rough surface of this fruit offers many places for the lodgment of the bacteria and moulds, one is not surprised to see his specimen covered with mould within twenty-four hours. How to overcome this was a perplexing problem. I resorted to the following procedure: I made a saturated alcoholic solution of the bichloride of mercury, and dipped the strawberry into it. I then allowed the fruit to dry, and sliced away one side of the berry with a sterilized knife, and then made a section of the upper part of the fruit. By this means I was able to keep the fruit sterile for days. Another difficulty which I could not overcome, was the persistency with which the cantaloupe disintegrated.

The surface of the watermelon seemed to be an admirable culture medium for the cholera spirillum. The pineapple seems to-

contain some inherent substance which is inhibitory to the growth of the cholera spirillum. A very interesting fact was brought out in relation to the sour and the sweet oranges, and the lemon. The cholera spirillum lived for five minutes in contact with the cut surface of a sour orange, and for thirty minutes in contact with the cut surface of a sweet orange, while in contact with the cut surface of the lemon, it lived for less than five minutes.

The culture medium used for growing the cholera spirillum in, and for making the inoculations into, was Dunham's solution, a simple alkaline solution of peptone. This is by far the best culture medium for the cholera spirillum that I have ever tried. I wish to record a very curious phenomenon concerning the staining of this cholera spirillum in this series of experiments. I always used the Ziehl carbol-fuchsin solution, as it is easy of manipulation and gives a vivid picture. I noticed in the distinctly acid fruits, that, towards the end of the experiment, the spirilla would invariably stain in an interrupted or beaded manner. Long spirilla would look like long chains of beads. I can not more aptly illustrate this than by comparing it to the interrupted staining of the bacillus diphtheriae by Loeffler's method. As the spirilla became more and more unable to resist the fruit acid, this interrupted staining became more and more apparent. Often I would make an inoculation into gelatin from one of these attenuated or weakened growths, and invariably, within twenty-four or forty-eight hours, I would get a growth of large, fat, rounded, vigorous looking comma forms. They would look as if they had been treated to a good appetizing meal, after nearly being starved on the acid fruit. This rejuvenating of the cholera spirillum could always be done by transferring it to a gelatin culture medium.

None of my inoculations became contaminated in this series of experiments; neither did any of the control inoculations show any contaminations of the cut surface of the fruits.

What practical lessons can be drawn from these experiments? The following seems to me to have been proven:

1. That the sterile cut surface of most of our fruits is inhibitory to the growth of the cholera spirillum; some of them destroying it rapidly, others taking a longer time.
2. That it is a dangerous practice to sprinkle or wash the cut

surface of our fruits with water infected with the cholera spirillum.

3. That fruits in themselves do not contain or by growth spontaneously originate the cholera spirillum.

4. That some fruits, notably the watermelon and cantaloupe, offer a splendid culture soil for the cholera spirillum.

5. That in cholera infected places, oranges and lemons are the safest fruits to use, they acting almost as prophylactics.

6. That a strongly acid lemonade would be the safest drink to use, in order to guard against the cholera spirillum.

7. Never use a fruit in a cholera infected country, unless you yourself see it cut with a sterilized knife, and know that the surface of the fruit is free from the cholera spirillum.

8. That the very common practice, especially in tenement house districts, of exposing for sale sections of fruits, such as watermelon, oranges, cocoanuts, pineapples, *et cetera*, floating in water, should be strictly prohibited in all countries where there are any cases of cholera.

NOTES BY A MEDICAL OFFICER IN THE EAST.

BY MAJOR CHARLES C. FOSTER, Surgeon, M. V. M.

On the sixteenth of last November I sailed from New York, bound for Egypt and the East, and intending to see what I could of military hospitals on the way. I landed at Ismailia, on the Suez canal.

The Egyptians are physically a fine race, especially the porters, who are magnificent specimens. The Egyptian soldiers are very pretty to look at, and drill well. For some years they have been under English officers, and with good and just treatment, formerly unknown in Egypt, have improved greatly in morale. At Assouan I saw a battalion of the famous Soudanese soldiers, also under English officers; fine, tall men, but with queer, negro legs. They are the finest fighters in Africa, are more trusted than the ordinary Egyptian troops, and hold the frontier posts, such as Wady Halfa on the Nile, and Suakin on the Red Sea.

At Cairo I visited the English military hospital in the old palace in the citadel; a fine, healthy location, high above the city, with pure air and a wide view. The palace contains many large and high rooms which make excellent wards, being cool and well ventilated. The old latrines, simply holes in the floor leading to vaults below, have been sealed up, and the earth-closet system, which I do not like, substituted. Galvanized iron buckets are used, special ones being reserved for cholera, typhoid and dysentery patients. Stools are disinfected by solutions of carbolic acid. No quicklime or strong acids are used, nor are stools destroyed by fire. East of Cairo water-closets become very rare; I do not believe there are a dozen in all India.

The kitchen of the hospital is in a small, detached building. The water-supply is taken from the Nile, and for drinking is filtered through old-fashioned and inefficient filters.

Typhoid and dysentery are the commonest diseases in the garrison, except venereal, which cause a large proportion of all illness among English troops in the East.

The medical and surgical equipment, both in Egypt and in India, seemed to me behind the times. Instruments are of old patterns; panniers are bulky and heavy, and loaded with bottles of useless fluid medicines. I saw some small tin cases of old-fashioned pills, but very few modern tablets. Panniers are made in pairs, to be carried on mules or camels. I saw no good operating rooms or tables. For transporting the wounded, heavy ambulances are used in the garrisons, and in the field mule and camel litters or cacolets, which the medical officers say are pretty bad. In India where human labor is so plenty and so cheap—a coolie will work for two dollars a month, and find himself in everything—the *dhooly* is used. This is a covered litter hung from a single longitudinal pole; and is a most comfortable vehicle. It is carried by four men, two more going along as reliefs, and can make long marches.

At the Cairo hospital there are plenty of trained English hospital-corps men, but in India natives are employed. They are cheap, but not reliable. In the hospital at Delhi I saw a soldier seriously ill being attended by three detailed men of his own company, who relieved each other. I was told that this was common. Of course such a system is bad, and impracticable in the field.

An Indian field-hospital has forty natives attached to it, twenty of whom are nurses, the remainder being cooks, sweepers, water carriers, etc.

Besides these permanent hospital-corps men, there are bearers in every company, as with us. Some few of these are taught enough to make themselves available for hospital service in an emergency. In Cairo there is now a medical school which is said to be turning out very well qualified native practitioners, who are to be the medical officers of the Egyptian army.

In the matter of asepsis the English surgeons in the East, both civilian and military, are behind the times. Instruments are laid

in a carbolic solution, and a carbolic or sublimate solution, made with unboiled water, is used on the wound and for dressings. Iodoform is freely used. I saw no steam sterilizers, nor did I anywhere see instruments or dressings either baked or boiled. Very much the best asepsis I saw was in a mission hospital for native women in Delhi, run by some English women doctors.

All over the East the question of water-supply is a very serious one. In Egypt the Nile water, practically the only water in the country, is muddy, but, above Cairo at any rate, perfectly wholesome when it first leaves the river. After it has flowed some miles in an almost stagnant canal, and a number of dead animals have been thrown into it, then it begins to be doubtful.

In India, and in most of the English colonies in the East, nearly all large towns have a fairly good aqueduct system; but small places must still use water taken from streams, wells or "tanks," and brought to the consumer in a filthy goat-skin. These "tanks" are often of surprising vileness. Imagine the greenest duck-pond you ever saw, and you will have an average tank. All the washing of the neighborhood is done here; the cattle stand in it half the day and of course defile it, after the manner of cattle; and when your servant milks your cow he steals part of the milk, and makes up the deficiency with this water. Bottle-fed babies do not thrive on this mixture. I saw one Pasteur filter in India, imported by an American woman. In China, pretty bad looking water is used, but the Chinese always boil it, which the Indians do not do.

In India I heard of a native drug called *eesoof-ghool*, of repute in the treatment of dysentery and diarrhea, except of children. It is a seed, which when soaked in water exudes a mucilaginous substance, and finally forms a firm jelly. This when eaten freely is supposed to have a most soothing effect on an inflamed intestine. I have brought home some of the drug and intend to have it thoroughly tested. Several Englishmen who have used it assured me that it benefited them greatly.

In India, and indeed all over the tropics, fever is a matter of course. Everybody has it, and everybody talks about it, as they talk about the weather elsewhere. There are many types. The

Delhi fever is a very acute form. The patient is feeling perfectly well, very likely particularly well, this being really the first stage of the fever, or stage of exaltation. Half an hour later he is feeling poorly, and has a headache. In another half hour he is delirious.

In Delhi and Cawnpore, small-pox was prevalent last winter; and in Lucknow a boy, from whose face the scales were just peeling, walked into a shop in the bazar where I was sitting. This was an everyday affair, and nobody took any notice of it. The Chinese method of inoculation is simple and effective. A scab is begged from a patient, thrust up the nose of the person to be inoculated, and left there. It is pretty sure to take effectually.

Cholera I saw nothing of. A sporadic case occurred from time to time in some of the suburbs of Calcutta, where water from some of the local "tanks" is used, but there were no cases in the city. Nothing new has been learned as to treatment. Acid mixtures by the mouth, and intra-venous injection of salt solution are at present in favor. The great importance of handling and transporting patients as little as possible, and keeping them absolutely quiet in bed, is emphasized.

At Singapore I saw a number of cases of beri-beri, which is very common there among the hard-worked and poorly-fed coolies, both Chinese and Kling. The patients seem very sick, yet they almost always recover. At first there is great general œdema, with difficult breathing, aching in the muscles, and tenderness on both light and firm pressure. Later comes loss of the knee-reflex; and finally almost complete general paralysis, with extreme atrophy. The treatment is simple. At first boiled pineapple, especially the skin, is given. This is a most efficient diuretic, and soon reduces the œdema. Strychnia, liberal diet and rest complete the cure; but recovery is slow, often taking three months or more.

In India and China I saw a number of cases of leprosy varying in severity from one or two scaly patches on the skin to a face terribly disfigured. I saw hands and feet that had lost most of their fingers and toes, each stump tapering off into a white end that looked like a cylindrical lamp-wick. The natives pay no attention to these unfortunates, who are generally beggars, and

seem to have no objection to associating with them. I hear that Kitasato is trying to produce a leprosy antitoxin, but has not yet succeeded.

The Chinese army has practically no medical department, though it really compares well with other departments of the same army. At one or two of the larger military stations there are so-called hospitals; but little is done there for the sick, and that little might often be better left undone. I heard of a gun-shot fracture of the humerus being treated as follows: The surgeon procured a dead rat which he singed, and then bandaged it upon the wound; dismissing the patient, after getting his fee, with the assurance that he would soon be all right. Very naturally the man died of septicemia. The Chinaman is a good surgical patient, for he is tough, and seldom suffers from shock, while the East Indian coolie often dies of shock after a trifling injury, but his case is apt to be complicated by an enlarged spleen.

When I reached Hong Kong I found that the plague had broken out there. This was an opportunity to see something that few American medical men had seen. Dr. Arnold of the navy, who is studying the plague, introduced me to the medical officers in charge of the pest hospital, who showed me all their cases, alive and dead, gave me copies of all reports that had been published, and invited me to come to the hospital as often as I wished. I felt as if I had been carried back into the Middle Ages.

A typical case usually comes in with a temperature of 103°-104°, often with a severe rigor (which, by the way, seems to have no effect on the temperature), very likely with vomiting and purging. Somewhere about him, in the groin, the inner aspect of the thigh, the axilla, or the neck, there is a glandular enlargement, often extensive and brawny, the bubo. This patient has probably been sick two or three days, and the chances are nineteen to one that he will be dead in two or three days more, or in a week at the furthest. If he lives ten days he has a good prospect of recovery; but this is very slow, and leaves him for months the wreck of his former self.

The cause of the disease is a bacillus, discovered and described by Kitasato during the Hong Kong epidemic of 1894. It is found in the feces, the contents of the enlarged glands and the blood.

Examinations of vomit and sputa have given only negative results. The predisposing cause of the ordinary ones—filthy habits, unsanitary houses, underfeeding, overcrowding etc. The degree to which all these are carried in a Chinese town exceeds Anglo-Saxon imagination.

The modes of infection are, first, by inoculation; it was thus that the Japanese physicians who were studying the epidemic of 1894 caught it, while making autopsies. A second mode is by swallowing the poison; animals fed upon diseased tissues are sure to die. It is probable, but not certain, that breathing infected air is a third mode.

The period of incubation is usually three to six days; nine days being the longest recorded.

The disease begins with malaise, coated tongue and *severe* frontal headache. Temperature rises gradually, reaching a primary maximum of 104°-106° in about thirty-six hours. The bubo usually appears by the end of forty-eight hours, and is very painful at first, becoming less so later, especially if it suppurates and is opened. This occurs most often at the end of five or six days, and is considered a favorable symptom, marking the end of the first stage of the disease. The temperature usually falls at the same time, and the patient begins to have some chance of recovery, but he is in a very low condition. A cut made in opening a bubo will make no progress toward healing for weeks; and when union does take place a good deal of keloid is apt to be formed in the scar.

Vomiting occurs early, and is usually greenish at first, becoming brownish later. Either constipation or diarrhea may occur. Incontinence of urine and feces is common.

Dyspnœa is usual. In the later stages cough is sometimes caused by œdema of the lungs. The urine is dark, with high specific gravity and increased urea. Casts are usually absent, and there is never more than a trace of albumin. The pulse is at first full and bounding. Later it becomes dicrotic, compressible, and often intermittent.

Severe frontal headache is an invariable early symptom. Strabismus sometimes occurs. Delusions sometimes occur, but usually do not last long. Some patients remain throughout their illness

drowsy and apathetic, but more or less conscious. Some are comatose, some wildly delirious, some have severe convulsions. Nearly all pick at the bedclothes, and try to catch imaginary objects.

Treatment has proved very unsatisfactory. An antitoxin would be the ideal treatment, and the Pasteur institute in Saigon is now preparing one, using horses as culture animals. The first lot should be ready by this time. Since writing the above, I learn that Dr. Yersin has tried the antitoxin at Canton and Amoy and found it very successful if used in the early stage of the disease.

In a doubtful case a differential diagnosis can be made by microscopical examination of the blood for the bacillus; but this is seldom necessary.

Death occurs usually either by heart-failure or by œdema of the lungs. Autopsies show that the liver and spleen are seldom markedly enlarged, though usually rather softer than normal. Lungs and kidneys are somewhat congested. Large hemorrhages in the mesentery are common. The mesenteric glands are always enlarged and hemorrhagic, (sometimes suppurating). The intestine is often deeply injected. The meninges of the brain are invariably hyperemic; both dura and pia are reddened all over the brain, especially at the base. The brain itself is sometimes hyperemic, but hemorrhages into its substance are rare. The microscope shows the presence of the bacillus in the blood, the feces and the enlarged glands.

The mortality in the epidemic of 1894 was, among Chinese 94%; among Europeans 20%. Very few Europeans were attacked, because few were much exposed.

The plague may sometimes become something more than a medical curiosity to us. We have large Chinatowns in San Francisco and Portland (Oregon), and smaller ones in many other cities. If the plague gets started in any of them, it will spread like wildfire; and white men catch it as well as Chinese, if exposed to it, though fortunately they seem to recover more frequently.

We must make our Chinatowns comparatively decent, and then keep them so; which will be no easy task. Chinese overcrowding

is twice as bad as the worst that Italians are ever guilty of. They have a trick of dividing each story of a house by putting in intermediate floors, and then packing the whole space, above and below, with bunks. You can imagine the amount of air-space and light that each man gets; but the stink that results from their filthy habits and opium smoking you cannot imagine; you must smell it for yourself.

On March the twenty-third, by special permission from Surgeon General Ishiguro, I visited the principal military hospital of Japan, at Tokio; and found it a most excellent establishment. I thought that a great deal had been accomplished for the money expended.

The wards, and most of the other buildings, are cheap, one-story, detached wooden structures with verandahs, well ventilated, but at that season rather cold.

The operating-room is excellent; lighted from above, with sloping cement floor and a good operating table, and well supplied with modern appliances and instruments. There are plenty of trained hospital-corps men. The surgical wards are mostly supplied with good iron bedsteads, but some primitive wooden ones are still in use. The asepsis is excellent. Solutions are used somewhat, but boiled water and sterilized instruments and dressings are their main dependence. I saw some very good absorbent pads made of burned straw (charcoal) packed loosely in bags. They are very absorbent, deodorize discharges, are cheap, and can be made anywhere. Chemical and bacteriological laboratories, with modern equipment, are attached to the hospital.

I saw some patients yet remaining from the Chinese war; men who had received serious gun-shot wounds of bones and joints, and made tedious recoveries. The results, for such cases, were remarkably good; and many of the patients might have been discharged long ago. These wounds were all made with the old-fashioned, large bullets; hardly any new, small-calibre rifles were used in the war.

In the medical wards, beri-beri and malaria were the prevailing diseases. Both wards and patients were perfectly clean, as everything is in Japan.

The field equipment is good. I saw a very complete and compact case of general operating instruments, and a compact medical

case filled with square bottles containing tablets. The litter is very light; having bamboo poles, without legs, and canvas or netting bottom. This is the usual means of transport for the wounded. On account of the scarcity of horses almost all the transport in the Chinese war was by men; many of the *jinrickisha* men being attached to the army for this purpose.

This visit ended my medical experiences in the East; and the next day I went aboard an American steamer—homeward bound.

My trip was a most enjoyable one. I was fortunate in being able to see beri-beri and the plague; and I shall not soon forget the kindness shown me everywhere by medical officers, both civilian and military, to whom I wish publicly to return my most sincere thanks.

ASBESTOS SURGICAL FIELD DRESSINGS.

BY MAJOR D. M. APPEL, Surgeon, U. S. Army.

My attention was first directed to the use of asbestos surgical dressings by Dr. Roswell Park, to whom a package of the fibre was sent for trial by Dr. Evan O'Neill Kane, of Kane, Pa.

The employment of such dressings originated with Dr. Kane, and he has practically demonstrated their efficacy.

I do not intend to expatiate on their merits as surgical dressings, but merely to call the attention of this Association to their advantages for use in the field.

Asbestos fibre, which is soft, unirritating and very absorptive, is also very compressible, so that a large quantity can be carried in a small package.

When thoroughly wet it becomes, as Dr. Kane says, "as slippery as soap," and can be readily removed from a wound surface. Those of us who have had experience in removing primary dressings of gauze and absorbent cotton, which had been applied to extensive lacerated wounds, can appreciate the advantage of this quality.

Owing to this same quality, asbestos wicking is admirably adapted for drainage, and asbestos paper can be substituted for absorbent gauze.

But the special quality which renders these materials pre-eminently suitable for field dressings is their indestructibility by heat.

They can be carried without any regard to cleanliness and when required for use can readily and certainly be rendered aseptic with fire in one minute.

Should the supply be limited, the dressings removed can be cleaned and again sterilized.

PROBLEMS IN MEDICAL ADMINISTRATION, WITH
SOLUTIONS. ACCCOMPANIED BY SUGGESTIONS AS
TO THE APPLICATION OF THIS METHOD TO THE
INSTRUCTION OF THE MEDICAL OFFICERS OF
THE NATIONAL GUARD.

BY COLONEL DALLAS BACHE, Assistant Surgeon General, U. S. Army.

In pursuance of a thoughtful scheme to promote and sustain an active interest of the medical officers in his jurisdiction toward the manifold demands of military hygiene, questions of equipment, supply, and organization, the Chief Surgeon of a geographical military department, I regret to say not my own, has published from time to time problems in medical administration, for which solutions are required under certain rules as to the class of problems, and as to time.

This form of instruction is not contemplated by any general order or by any regulation, there is nothing competitive in such an examination, the registered standing of a medical officer is nowise in peril by its results, and although it is presumable that some one satisfied with his own proficiency might treat this educational effort with perfunctory attention; yet when we reflect that the most experienced medical officer has, under the ordinary conditions of our military system, but little handling of many of the important subjects of his calling, that for much there is no guide, and that suddenly we may be confronted by just such problems of administration as are here presented, the wisdom of the form and purpose of this method seem plain, and the benefits to be obtained by its judicious management important and adequate. Sound information on many technical subjects must be added to a purely medical education before the military medical officer is fitted for the responsibility of his special work. His material is

prepared for him, and modification follows slowly, and only when faults or insufficiency are demonstrated by general experience. As to method he is part of a system, with limited powers to improvise and restricted opportunity for ingenuity, so that if he neglects the day of small things because it is tranquil, and is not familiar with the substance and purpose of the co-ordinated life within which he moves, when he is suddenly faced in a new direction, and works with a new assemblage of parts, his usefulness will be severely impaired while he is being thus schooled, or he may fail altogether.

Preventive sanitation has more to do with the effective of an army, and in so much with the results of the application of its force, than remedial medicine and wise surgery; and if a medical officer is to be a sanitary counselor, as he should, he must know not only the Hippocratic trinity, "airs, water, and places," but the man separately and men in mass, their food, clothing, shelter, capacity for various work, and a multitude of details with which the civil physician has ordinarily no dealing whatever. This is not disparagement of or any deduction from the value of the physician, but it is to note and emphasize the direction of a new activity and a new usefulness, for which he requires a special preparation, a special order, and much precision. It cannot be urged too insistently, seasonably or not, that the efficient military medical officer can no more be summoned out of the competent civil physician by the gift of a commission, or extemporized by civil approval, than the wisdom and value of a specialized expert can be grafted upon the best general attainments within the profession by an assumption of title, and without serious study and patient practice in the chosen or appointed direction. Nor again is proficiency the product of one or many examinations, although these are valuable collecting stations for information, and the only standards of measure available in the absence of the test of actual performance; so that a medical officer may have grown mature in the army, content with the satisfactory performance of duties as defined as the dial of a clock, and yet, unmindful of more active demands be unready for the serious expansion of his work and its unfamiliar direction. If then problems such as are given here can be applied profitably to the education of the professional medical soldier, and of that I have no doubt, it has seemed to me

that, at least in States where the National Guard is a compact and progressive organization, this method may be centrally used to stimulate and carry forward the interest of its medical officers in problems which they may be abruptly called to meet.

I do not know how far nor along what lines the authority of a Surgeon General of a State extends, and the presumption is that it varies locally in intensity and effect; but I think that nowhere will be seriously contested the wisdom of an intelligent effort to advance beyond a competency for the lesser duties of a camp of practice, and ordinary summons, to the preparation for the larger and more protracted military operations. It is not thought that any such academic method as that under discussion is suitable for instruction in camps or cantonments of summer practice, for there the term is short, and the school is one of application; but if this system is considered useful or attainable, the problems might be given to the medical officers assembled at a State camp, the solutions to be sent to central authority within a fixed period, say six months, and a discussion of these problems and papers fixed for the next annual camp, the precise literary procedure in camp being determined by the conditions regulating the medical personnel. Along some such recognized and broadening way, once opened, I think that interest and pursuit will be glad to follow.

PROBLEMS IN MEDICAL ADMINISTRATION.

Problem No. 1.

A camp of 1000 infantry and 200 cavalry for instruction in field work is to be established June 1st, to continue three months. Two sites are proposed, each equally available for military purposes. One is a gravelly, treeless plain of indefinite extent, underlain at an average distance of six feet with deep clay. The general slope of this plain is toward a stream, Rio Chico, whose banks are three feet high, whose bottom is gravel, and that runs southwest. The average volume of water June 1st is twenty feet wide by six inches deep with a mean velocity of three feet per second. This gradually diminishes until it disappears by the middle of July, except in occasional holes which are supposed to have an underground connection. Within a distance of a mile and a half a

daily supply of 10,000 gallons can be depended upon from these holes.

Three miles away in a rocky canon is an unfailing spring, giving 5,000 gallons a day, but this flows away for the Rio Chico. In both cases the water is very hard, but it is believed to be free from organic contamination. Sharp thunder-storms may be expected at frequent intervals throughout the summer, and the stream will run bank-full from a distant cloud burst at least once in the season, but no very considerable quantity of rain will fall at any one time in the camp.

The second site is on the north bank of a somewhat sluggish but constant stream, Rio Bonito, free from human contamination, that runs due east through an alluvial bottom and carries a good deal of soil in suspension. The south bank of this stream is bounded by marshes half a mile wide. The possible site is a slope about one foot in forty, with arroyos eight to ten feet deep, running through to the south, about five hundred yards apart. Its southerly margin is six feet above the river bottom and about twenty yards from it. In high water this bottom is overflowed. One-half mile to the north are sandstone bluffs fifty feet high broken by canons. The plain stretches indefinitely east and west, is fringed with cottonwood on the southern border, and is sparsely covered with similar trees. A copious growth of underbrush, rapidly diminishing to the north, is along the brink, and sage brush grows plentifully upon the plain. Sandstone in level strata is believed to underlie the river at a depth of ten feet, and to connect with the bluffs. Moderate rain may be expected in the first half of June, and severe but short storms in August.

The Rio Chico is about 6,000 feet above the sea level, the Rio Bonito is about 4,000. In both cases the temperature will rise to 80° or 100° F. in the shade in the day during the most of the summer and will fall to 40° or 60° F. at night, the greater changes being at Rio Chico. The questions of fuel and grass are equalized between these sites and may be eliminated.

A medical officer is sent in May to examine the sanitary relations, and the location will depend upon his report.

- (1) State what matters should be looked into and what condi-

tions may be anticipated at each site. Give reasons in detail for accepting one and rejecting the other.

(2) Having chosen one, what area would the camp be expected to cover, assuming it to be laid out according to the regulations? In what direction should it face and how should its different elements be arranged, having no reference to offensive or defensive operations? What advice should be tendered if called for, or if sanitary errors are about to be committed, in relation to the water supply, the shelter, the position and character of the sinks, their care, the disposal of refuse, and the hours for reveille, drill, and tattoo?

(3) What equipment should be secured, if practicable, for the Medical Department? Report this in detail, mentioning everything to be drawn from the various departments for the complete supply of the hospital. How large a detachment of the Hospital Corps would be necessary for the daily work of the camp, assuming that no sick are sent away. Note in detail the duties devolving upon each of the Hospital Corps men. What diseases may be expected to prevail, and what would be the probable daily ineffective?

(4) Assuming that six medical officers and fifty men of the Hospital Corps were attached for drill and instruction as well as for the current labor, note the number of each grade and prepare a programme for their summer work, taking into account the probable use of the troops in the operations of war.

Solution.

POST HOSPITAL,

Fort _____, _____.

CHIEF SURGEON,

December 9, 1895.

Department of the _____,

_____, _____.

SIR :

I have the honor to offer the following solution of the third situation in "Problems in Medical Administration, No. 1" issued from the Medical Director's Office, Headquarters Department of the _____, October 28, 1895.

The situation is thus stated. A camp of 1000 infantry and 200 cavalry for instruction in field work is to be established June first, to continue three months. Two sites are proposed, each equally available for military purposes. The question of fuel and grass are equalized between the two sites. The choice is to be determined by a study of the sanitary conditions of the respective sites.

The problem involves an investigation of the water supply, the soil and drainage, and the character of the surrounding country.

The site which will be first considered is described as follows: "A gravelly, treeless plain of indefinite extent, underlain at an average distance of six feet with deep clay. The general slope of this plain is toward a stream, Rio Chico, whose banks are three feet high, whose bottom is gravel, and that runs southwest. The average volume of water June first is twenty feet wide by six inches deep with a mean velocity of three feet per second. This gradually diminishes until it disappears by the middle of July, except in occasional holes which are supposed to have an underground connection. Within a distance of a mile and a half a daily supply of 10,000 gallons can be depended upon from these holes.

Three miles away in a rocky canon is an unfailing spring, giving 5,000 gallons a day, but this flows away from the Rio Chico. In both cases the water is very hard, but it is believed to be free from organic contamination. Sharp thunder-storms may be expected at frequent intervals throughout the summer, and the stream will run bank-full from a distant cloud burst at least once in the season, but no very considerable quantity of rain will fall at any one time in the camp."

(1) The water supply.

During June and the first days of July, the quantity of water in the rapid stream will be ample. But when the Rio Chico ceases to be a running stream and the water supply is reduced to 10,000 gallons per day, found in occasional holes that are distributed throughout a mile and a half of the river bed, the quantity will be insufficient and the quality poor.

The camp is to comprise 1,200 men, 200 horses, and at least 100 mules used in transportation. The daily requirement of water, as estimated by authorities on military hygiene, is one gallon per

man for drinking and cooking purposes, and six gallons per horse. "For washing and bathing, and general police purposes, the requirement varies with the locality, the season, and the duty, and is from ten to fifteen gallons per head daily."¹ The quantity needed daily therefore in this camp for drinking and cooking is 3,000 gallons. Deducting this amount from the total supply there remain 7,000 gallons, or 5.83 gallons per man, for other purposes. As two gallons per man are necessary for ablution of face and hands, less than four gallons are left for bathing and general police purposes. Were it possible to economize this amount, as by a shower bath in a suitably contrived bath house, or even by a sponge bath taken in a tent, it might suffice. But bath houses and bath tubs are not provided for troops in temporary camps, and for the most part the soldier must bathe in the open air, in the natural water courses. In the case under consideration the water supply is standing in holes few in number, compared with the number of men to use them, and many men must necessarily bathe in the same water hole. Under these conditions the supply of water in the Rio Chico is insufficient.

The quality of water standing in holes soon deteriorates; it is unaerated and therefore unpalatable. *Confervaceae* or other fresh water algae may be expected to appear, forming a green or red scum on the surface of the water, and should these plants die or decompose, as often happens from change of temperature, they would give a bad taste and odor to the water, probably cause diarrheal troubles, and possibly malarial fever. A resource remains in the unfailing spring three miles away. It will cost much labor to impound and haul to camp the water of this spring, but if the site on the Rio Chico be chosen, the health of the command will in all probability make this work necessary. By this means a fairly good and sufficient water supply may be obtained.

The hardness of the water of both spring and river is not necessarily a serious objection. Very hard water is not as good as soft water for washing, or for cooking; if the hardness be permanent, it may be impossible to cook beans in the water. Should it contain a large amount of lime and magnesia, its use may cause constipation alternating with diarrhea, as well as other disorders of

the digestive system. As a rule, however, hard water, even "very hard" water, is not unwholesome.

(2) The soil and drainage.

The gravelly plain of the Rio Chico has an argillaceous and therefore an impervious substratum. The salubrity of a gravelly plain with unfathomable bed-rock is unquestionable. But when such a plain has an impermeable subsoil, and borders or overlies a water course, moisture will underlie and permeate the surface soil, and its very porosity, favoring as it does the generation and exhalation of malaria, then becomes a disadvantage. "In general it may be said that an impervious subsoil, especially when it presents depressions which prevent the natural movement of the ground water, covered by a porous surface soil, furnishes conditions most favorable to the development of malaria."² The bed of the Rio Chico is higher than the underlying clay of the adjoining plain, and at least once in the season the water in the stream will rise to the surface level of the plain. Until the middle of July the soil for some distance will be kept constantly moist by percolation from the stream, and in the more distant parts of the plain it is probable that there will be sufficient ground water to keep the earth moist throughout the summer, for water neither runs off nor runs through clay. The dry river bed will be especially pernicious, for under it will be a subterranean stream which by evaporation will supply unfailing moisture to the gravelly bed above. There may be but little organic matter in the river bed, but a very small quantity, exposed thus to moisture and the heat of the midsummer sun, will suffice for the production of malaria.

The elevation of the site on the Rio Chico is about 6,000 feet above the sea level. The temperature rises to 80° or 100° F. in the shade during the day throughout most of the summer, and falls to 40° or 60° F. at night. This altitude does not prevent the evolution of the malarial poison, while the great diurnal changes of temperature favor the development of malarial fevers. These fevers will probably be severe in character, with a decided tendency to remittent and continued forms. In addition to malarial fevers, internal inflammations, rheumatism and catarrhs may be expected to result from the conditions described.

(3) The surrounding country.

This is a gravelly, treeless plain of indefinite extent, and without special significance from a sanitary point of view, except for the depressing effect of the cheerless monotony, and its shadeless glare which may prove harmful to the eyes.

The alternative site is described in the problem as follows: "The second site is on the north bank of a somewhat sluggish but constant stream, Rio Bonito, free from human contamination, that runs due east through an alluvial bottom and carries a good deal of soil in suspension. The south bank of this stream is bounded by marshes half a mile wide. The possible site is a slope about one foot in forty, with arroyos eight to ten feet deep, running through it to the south, about five hundred yards apart. Its southerly margin is six feet above the river bottom and about twenty yards from it. In high water this bottom is overflowed. One-half mile to the north are sandstone bluffs fifty feet high broken by canons. The plain stretches indefinitely east and west, is fringed with cottonwood on the southern border, and is sparsely covered with similar trees. A copious growth of underbrush, rapidly diminishing to the north, is along the brink, and sage-brush grows plentifully upon the plain. Sandstone in level strata is believed to underlie the river at a depth of ten feet, and to connect with the bluffs. Moderate rain may be expected in the first half of June, and severe, but short storms in August."

The altitude is about 4,000 feet. The temperature is the same as at the Rio Chico, except that at the latter place the diurnal changes are greater.

(1) The water supply.

This is ample for all purposes throughout the season. The quality of the water is not of the best, but its use will probably not prove injurious to the health of the command. The suspended matters may be removed by letting the water stand and deposit them, hastening the deposition if necessary by the addition of alum or chopped cactus leaves. It is possible, however, that the water may cause diarrhea, and also carry malaria brought to the river in the drainage of the marshes on its right bank.

(2) The soil and drainage.

The soil of the proposed site is underlain with sandstone. This permeable substratum insures excellent deep drainage, while the

sloping ground traversed by deep arroyos provides good surface drainage. Under these conditions there need be no fear of stagnant subsoil water, "the chief determining cause of malaria."³ The sage brush that grows on the plain is a sign of a dry and alkaline soil which will probably occasion disagreeable dust. The growth of underbrush along the edge of the plain indicates much moisture in the soil at this point. But there is room for the camp without encroaching upon the strip of land thus occupied, and the growth if undisturbed may be expected during the summer months to assimilate all the products of decomposition in the soil and so prevent the giving off of malaria. The trees growing on the southern border of the plain and sparsely scattered over it, are not sufficiently close together to prevent ventilation, and they furnish agreeable shade. They also give needed protection—as will be seen later—from an unsanitary neighborhood.

(3) The surrounding country.

On the north of the proposed site are bluffs and canons. In the severe storms which occur here in August, the canons will gather the water and send it down in torrents to the plain. But as the storms are of short duration, and the plain is intersected by arroyos from eight to ten feet deep, the flooding of the camp need scarcely be feared. The possibility of such a disaster can be readily determined, as record of past floods is to be found in the scattered driftwood or other debris. To the east and west stretches the salubrious plain. On the south there are undesirable features: the alluvial bottom-land subject to overflow from the Rio Bonito, which runs through it, and the marshes on the south bank of the stream. Damp bottom-lands and marshes are with few exceptions malarious. The danger from these, however, is modified in the present instance. The alluvial bottom is uncultivated, and as long as its soil remains undisturbed, it will perhaps give off less malaria than the plain of the Chico. "Sandy plains, where there is an impervious substratum of any kind, are, perhaps, more prolific sources of malaria than undisturbed alluvium, especially when the surface of this is baked by the sun, or covered with vegetation."⁴ The time of the encampment is fixed for the months of June, July and August, and during these months both bottom-land and marshes will be least dangerous, as

it is then that vegetation is most active, consuming the malarial-producing matter in the soil, and absorbing the malarial emanations given off from it. The belt of trees on the southern border of the plain between the marshes and bottom-land and the site of the camp, thus forming a barrier against the noxious exhalations of the malarious districts which lie to the south, and therefore to windward, of the proposed camp. Although the prevailing winds are here southerly, a northerly breeze from hill to plain is to be expected in the evening, the time when the danger from malaria is greatest. If the alluvial bottom be avoided at and after night-fall, there will be little to fear from malaria.

The conditions to be anticipated at the two sites may be summarized as follows: at the Rio Chico, a good and sufficient water supply during the first six weeks of the encampment, but for the remainder of the time either a poor and insufficient supply, or a fairly adequate supply at the expense of great labor; a malarious soil, no shade and great diurnal changes of temperature; and as a result of these conditions, the development of diarrheal troubles, malarial fevers, catarrhs, rheumatism, and internal inflammations; at the Rio Bonito an ample water supply throughout the season, not of the best quality, yet not unwholesome; dry, well drained, well shaded, non-malarious ground upon which to pitch the camp; the neighborhood to windward malarious, but made practically harmless by favorable circumstances.

As the sanitary conditions of the site on the Rio Bonito are evidently superior to those existing at Rio Chico, the site on the Bonito is recommended.

The command which is to encamp on the chosen site consists of two regiments of infantry and a squadron of cavalry. The area covered by the camp will be 214,800 square yards, exclusive of the space occupied by an arroyo lying between the infantry and the cavalry. Each regiment of infantry, encamped "in column of divisions," occupies a space of 180 yards wide by 390 yards deep. The cavalry camp, "troops in line," measures 240 by 310 yards. In estimating the area of the infantry camp it has been assumed that the men will use the common tent, that there shall not be more than three men in a tent, and that between each tent and the next in line there shall be left an unoccupied space equal in area to that

covered by a tent. If the conical tent with wall be used, with ten men to each tent, the depth of the camp will be decreased by about forty yards.

The camp should face the north, with the cavalry on the right—down stream from the infantry. It should be pitched far enough from the southern edge of the plain to leave undisturbed the growth of underbrush which is found here. Washing, bathing, and watering of horses should be done below the source of the water supply for cooking and drinking. If practicable, receptacles should be provided in which the water may stand and deposit the suspended matters. If reasons appear for suspecting that the water is malaria-laden, the supply for drinking should be boiled.

As there is no need to economize space in this camp, the common tent is recommended for shelter. This tent, as now issued with walls which can be raised and with holes near the ridge for ventilation, makes comfortable quarters for two men, and can be occupied by three—at least in summer—without danger from overcrowding. In these tents, the men are distributed more evenly and over a larger area, and are therefore less crowded than in conical tents; greater privacy is also secured, a privilege usually valued by the soldier after the publicity of the barracks. Once a week the tents should be moved to the unoccupied ground at the side of each one, and the former sites left exposed to the sun.

The sinks should be north of the camp, thus placing them to leeward, and as far as practicable from the river. There should be one sink for each company. It should consist of a trench two feet wide by eight to ten feet deep, and twelve to fifteen feet long. The earth dug out should be thrown to the rear, and every morning a layer of two or three inches in thickness should be thrown upon the accumulations in the pit. When filled to within three feet of the surface, the trench should be covered in and banked over with earth, and a new one dug. Box seats open to the rear should be provided. Urinals may be placed nearer the tents than are the sinks, and their use should be enforced.

Kitchen refuse should be thrown into barrels, raised from the ground on platforms in order to prevent contamination of the soil under them. Once daily the kitchen refuse, the gleanings of

the police parties and the stable manure should be carted to the general dumping ground, where decaying organic matter should be burned or buried. The dumping ground should be situated well to the northeast of the camp. It should be strictly enjoined that no filth or refuse matter be thrown into the arroyos near the camp.

The hours for reveille, drill, and tattoo should be as follows: Reveille from June 1 to July 1, at 5:00 A. M.; from July 15 to August 1, 5:15 A. M.; from August 1 to 15, 5:30 A. M.; and from August 15 to 31, at 5:45 A. M. Drill during June and July, from 7:00 to 9:30 A. M.; and in August from 7:30 to 10:00 A. M. Tattoo at 9:00 P. M. The hours recommended for reveille bring this call at about half an hour after sunrise, when there is less danger from malaria than at an earlier hour.

For the complete equipment of the Medical Department, supplies must be drawn from the Medical, Quartermaster's, Subsistence, and Ordnance Departments.

From the Medical Department the following articles should be drawn:

Medical Chest	No. 1	Surgical Chest	No. 1
Acidum salicylicum	botts. 1	Aether	tins 2
Alcohol	botts. 6	Chloroformum	botts 4
Ferri chloridi tinctura	botts. 1	Ichtholum	botts. 1
Iodoformum	botts. 2	Iodum	botts. 2
Liniment. rub., tablets	botts. 1	Linum (pulvis)	tins 2
Oleum ricini	botts. 5	Opii tinctura	botts. 1
Magnesii sulphas	tins 1	Petrolatum spissum	tins 4
Pot. et sod. tartras	botts. 4	Quininae sulphas	botts. 6
Sinapis nigra (pulvis)	tins 2	Sodii salicylas, tablets	botts. 2
Zinci oxidum	botts. 1		
Beef extract	tins 15	Brandy	botts. 2
Candles	kilos 5	Soap, castile	kilos 1
Soap, common	kilos 5	Sugar, white	tins 1
Whiskey	botts. 4		
Case, emergency	No. 3	Case, field	No. 3
Case, field, operating	No. 1	Case, pocket	No. 3
Field tourniquets	No. 20	First-aid packets	No. 20
Pouches, orderly	No. 3		
Bandages, roller	Boxes 2	Cotton, absorbent	kilos 1
Gauze, plain	metres 15	Oakum or its equivalent	kilos 2

Muslin	metres 5	Splints, felt for	pieces 4
Plaster, adhesive	metres 10	Plaster of Paris	kilos 2
Rubber sheeting	metres 4	"	
Blanket cases	No. 2	Blankets, gray	No. 20
Bedsacks	No. 30	Mattresses, hair	No. 6
Mattress covers	No. 6	Pillows, hair	No. 20
Pillow cases, cotton	No. 40	Sheets	No. 60
Shirts, cotton	No. 30	Towels, hand	doz. 6
Folding Field Furniture	sets 2	Field desk	No. 1
Close stools	No. 2	Commode chest	No. 1
Mess chest	No. 1	Food chest	No. 1
Brooms	No. 8	Buckets, fibre	No. 6
Crutches	pairs 1	Corks, assorted	doz. 24
Lanterns	No. 4	Litters	No. 2
Medicine glasses	No. 4	Vials	boxes 2
Wash basins, en. ware	No. 2	Basins for sponges, en. ware	No. 2

From the Quartermaster's Department the following articles should be drawn:

Ambulance with two litters each			No. 7
Tents, hospital	No. 5	Tents, conical wall	No. 1
Tents, wall	No. 3	Tents, common, with wall	No. 22
Axes	No. 2	Picks	No. 1
Hatchets	No. 2	Shovels	No. 2
Spades	No. 1	Mess pans	No. 6
Camp kettles	No. 4	Galvanized iron buckets	No. 4
Dippers	No. 2		

Hay for filling bedsacks. Two army wagons will be required for transportation of supplies.

From the Subsistence Department, four Dutch ovens should be drawn, and rations as required.

The equipment of the Hospital Corps, with the exception of the pouches, is supplied by the Ordnance Department. The pouches, one for each private, are furnished by the Medical Department.

The tents should be used respectively as follows: four hospital tents for wards, and one for mess tent; one conical tent with

wall for dispensary and storage of medical supplies; one wall tent for office, one for operating room, and one wall tent and one common tent for kitchen and stores; and twenty-one common tents for the use of the Hospital Corps. The estimate of tents for the men of the detachment is the smallest that can be made with a due regard for health. The comfort of the men would be greatly increased by the addition of five common tents to the number recommended.

The hospital should contain twenty beds. If more be needed they can be readily extemporized from litters and bedsacks. Blankets belonging to patients should be brought with them to hospital, so that only a small number for emergencies or exceptional cases need be furnished by the Medical Department.

For the daily work of the camp, assuming that no sick are sent away, a detachment of fourteen men of the Hospital Corps will be necessary. Three privates should be detailed as orderlies to the three medical officers assigned to duty with the squadron of cavalry and the two regiments of infantry. At the hospital there should be one hospital steward in charge of the property and its distribution and of the records; one hospital steward in charge of the dispensary and the dispensing of medicines; one acting steward to have charge of the kitchen and general police, and assist in keeping the records; one acting steward to supervise the work of the wards, and assist in the dispensary; three privates as nurses, one as cook, one as assistant cook, one for police in the kitchen, and one for general police.

In detailing the duties devolving upon the Hospital Corps, no estimate has been made for ambulance drivers, since, under existing conditions of the service, the Quartermaster prefers to furnish drivers. He argues that a skilled driver is employed for each team, and that to replace him by a temporary substitute, would deprive the regular driver of his occupation, while giving his work to a man presumably not so well qualified to perform it.

The diseases which may be expected to prevail in the camp are diarrhea and other diseases of the digestive system, and perhaps

malarial fevers. The probable daily ineffective is two per cent. of the command, or twenty-four men, one-fifth of whom will be disabled by injuries.

Assuming that six medical officers and fifty men of the Hospital Corps are attached for drill and instruction as well as for the current labor, the number of each grade will be as follows: One major, two captains and three lieutenants; three hospital stewards, five acting stewards and forty-two privates. Two hospital stewards, two acting stewards and ten privates being on duty in the hospital and camp, the remainder of the detachment will consist of one hospital steward, three acting stewards and thirty-two privates.

In addition to the actual duties of the camp, the following programme for summer work is offered. Except on Saturdays and Sundays and the days occupied in field manœuvres, there should be two and one-half hours of drill and instruction—drill for an hour and a half, and instruction in the remaining hour. The drill should comprise marching, the litter drill, and ambulance drill, the improvisation of litters and the methods of carrying patients without litters, and pitching and striking tents. Instruction should be given in elementary anatomy and physiology, in hygiene, in first aid, in nursing and in cooking.

In the various field manœuvres during the season, it will probably often be necessary for medical officers and orderlies to accompany the troops, with ambulances and equipment, to care for possible cases of sickness or injury.

In the contact operations of the troops the Medical Department should establish field hospitals, ambulance and first dressing-stations, and send forward litter-bearers from the latter to the line of battle. The ambulance stations and first dressing-stations should change position, as may be required by the advance or falling back of the line of battle; and the hospital itself, if endangered, should be moved to a suitable site in the rear.

It would be of incalculable value in the training of the Hospital Corps, and medical officers as well, if a given number of officers and men should represent on the field the killed and wounded. The

number of casualties and character of the wounds should be determined beforehand, a perfectly feasible arrangement in a camp of instruction, where the conditions of a coming engagement are known in advance.

1. Woodhull: Military Hygiene. Reference Handbook of the Medical Sciences, Vol. 3, 1886.
- 2, 3, 4. Sternberg: Malaria and Malarial Diseases. Wood's Library of Standard Medical Authors, 1884.

Other authorities consulted in the preparation of this paper are:

Smart: Hygiene of Camps. Ziemssen's Cyclopædia, Vol. 19, 1879.

Smart: Handbook of the Hospital Corps, 1889.

Parkes: Manual of Practical Hygiene. Wood's Library of Standard Medical Authors, 1883.

Very respectfully,
Your obedient servant,

_____.
Major and Surgeon, U. S. Army.

Problem No. 2.

- I. Fort Hesperus lies fifty miles off the North and South Railroad on a river, along which runs the line of frontier travel. Recruits are en route for distribution, 40 to Fort Hesperus, 20 to Camp Alert, thirty miles south-west down stream, and 15 to Fort Resolution, fifty miles east in the mountains. The officer commanding them after leaving the train at Eglantine telegraphs that two men are sick, one with high fever and great pain, and one with fever and an eruption, and asks assistance. He has no medical officer and no ambulance, and is bringing the two sick men with him in a hired wagon. There are no settlements along the road.

A junior medical officer is sent to meet them with an ambulance with all the accessible vaccine virus, and reaches the camp where they are two days from the post.

He finds the eruptive disease to be measles, and the other to have developed as small-pox. He intercepts the mail-rider going toward the railroad and sends this information in an official dispatch, to be telegraphed from the station to the post. After the messenger has gone, he further finds that the rubeolus case is protected against variola by effective vaccination, that all of the recruits have been vaccinated, but this protection in at least four cases is doubtful, and that the hired teamster is unprotected. He has virus enough for thirty insertions. He also finds that forty of the recruits are sure they have had measles, ten are sure they have not, and the remainder do not know.

- (1.) Give the dispatch verbatim.
- (2.) Should he have attempted to detain the rider for all the above intelligence or, failing therein, should he send a second message?
- (3.) How shall he arrange the transportation for the sick?
- (4.) To what extent, if at all, shall he use the virus?

II. The detachment will reach the post twenty-four hours after the message is received. The weather is likely to prove dry and mild, 40° to 50° F., but with severe sandstorms during the day, and cool, 30° to 35° F., and calm at night. There are two medical officers at the post, whose garrison consists of 350 men with adequate supplies of all kinds.

It is assumed that the medical officer's advice is followed in every particular.

- (1.) What will be the arrangements for the care and reception of these men?
- (2.) What rules will be laid down for their conduct and for that of the garrison?
- (3.) Detail in every particular, excepting the medical treatment, the course to be pursued until the entire detachment is distributed as originally designed.

Solution.

Fort _____, _____.

February 25th, 1896.

The Chief Surgeon,

Headquarters Dept. _____,

_____, _____

SIR:—

I have the honor to submit the following solutions to Sections I and II, Problems in Medical Administration, No. 2, Headquarters Dept. _____, Chief Surgeon's Office, _____, _____. December 20th, 1895.

I. (1.)

Red Butte Canon,

October 1st, 1895.

Adjutant,

Fort Hesperus, Arizona.

Seventy-five recruits two days from Hesperus. One case measles, one small-pox.

(Signed)

Smith.

(2.) On receipt of the above telegram the Commanding Officer would consult the Surgeon, who would at once take the necessary steps for the reception and care of the sick on their arrival. Any information in addition to the above would be superfluous. Hence the medical officer with recruits would attempt neither to detain the mail-rider nor to send a second message.

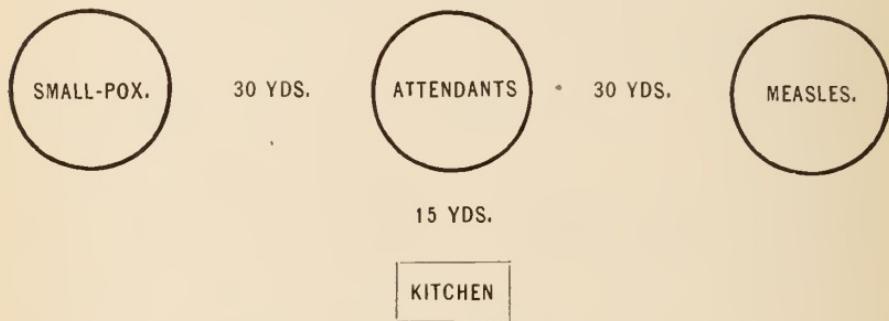
(3.) The arrangements for the transportation of the sick would depend upon the character of the hired wagon. If it were comfortable, the two patients would be kept in it and the ambulance reserved for cases developing later. If the hired wagon endangered in any way the safety of its occupants, use would be made of the ambulance at once.

(4.) The hired teamster and the four doubtful cases should be vaccinated at once.

II. (1.) A camp of detention should be pitched on the river bank one-half mile below the garrison. This camp should consist of two wall tents, seven conical wall tents and two common tents, *i. e.* one wall tent for the officer commanding recruits, one for the

medical officer, five conical wall tents for the recruits, one conical wall tent for guard and office purposes, one conical wall tent for suspicious cases of sickness, and two common tents for kitchen purposes. Each tent except the common tents should be provided with a Sibley stove.

A field hospital should be pitched on the river bank one-half mile below the camp of detention. This should consist of three conical wall tents with stoves, and one common tent, pitched thus:—



These camps should be prepared under the supervision of the Surgeon on receipt of the junior medical officer's telegram. They would be supplied with ten days' rations, fuel and a set of signal flags. The field hospital would be fully equipped with medicines and attendants.

A courier—a man protected against both small-pox and measles—would be sent out with dispatches to the officer commanding recruits directing him to send his sick directly to the field hospital, to march the remainder of the detachment to the camp of detention, and to communicate his wants at any time to the Officer of the Guard by means of the signal flags. The courier would be ordered to hold no communication with anyone but the officer in command, to keep apart from the detachment as much as possible and to return at once with any message the officer commanding recruits might send.

(2.) No communication should be allowed between the garrison and either camp, or between the two camps, except the necessary visits of the medical officer between the field hospital and camp of

detention. To enforce this a chain of sentinels should be posted around the camp of detention. The officer commanding recruits should ask by the signal flag for the supplies needed from time to time. These should be sent to a point one hundred yards from camp and there deposited. Later they should be brought into camp by the recruits.

(3). The medical officer with recruits should live in the camp of detention and should make as many daily visits to the field hospital as his judgment might indicate. He should make bi-daily inspections of the entire recruit detachment, which should be formed in line for this purpose at such hours as he might request. All men found suffering in any way should be at once placed in the tent set aside for the purpose, watched carefully, and, as soon as the diagnosis of small-pox or measles is made, should be taken with their bedding and personal effects to the field hospital. The usual precautions should be taken with all discharges from patients' persons. The dead should be at once buried under six feet of earth and far from any water source. The recruits should be kept busy with guard and fatigue duty and drills. Games should be encouraged and as cheerful an attitude cultivated as possible under the circumstances.

Two weeks after the appearance of the last case of measles or small-pox the officer and recruits in the detention camp should be ordered to bathe their persons and boil their clothing and blankets in water for one-half hour. A message should then be signaled to the Commanding Officer of the Post that in the judgment of the medical officer the recruits are ready to be released from quarantine. Upon receipt of the Post Commander's authority camp would be broken and these recruits distributed as originally intended.

The same plan should be pursued at the field hospital two weeks after skin of last convalescent is free from variolus crusts or rubeolus scales.

On the abandonment of the field hospital, the tents, hospital furniture, and stoves should be burned in conformity with Par. 1441, A. R., 1895.

The same course should be taken with any tents in the detention camp in which contagious disease may have appeared.

Very respectfully,

—. —. —. —. —.
1st Lt. & Ass't Surgeon, U. S. Army.

It is at once apparent on reading these interesting problems and solutions that, presuming a fair antecedent knowledge of the subjects with which general hygiene deals, the military demand goes much farther, and requires familiarity with the details of ordinary and extraordinary field service, and even some research and reference to authority. If you go over the solutions critically, which is, however, no part of the province or wish of this paper, you will be surprised to find how much knowledge of detail is required, and how easy it may be to omit essential provision.

The problems selected for examples were chosen from a large number, covering as a whole many situations of actual service, and all possible to a single military experience. As the summer camps of the National Guard, and the ordinary service in obedience to civil summons, do not and cannot in themselves illustrate a very wide range of medical administration, it has seemed to me, in considering the benefit of the system under review, easily possible to expand interest and instruction in this attractive theme by some application of this method, and in the way indicated.

It will be found, I think, that the industry necessary to make creditable or exhaustive replies to such problems as are indicated will be of educational service, not only as to medical administration, but also in the gain of general military information.

THE TREATMENT OF SICK AND INJURED CIVILIANS AT THE SUMMER CAMP.

LIEUT. H. A. ARNOLD, Assistant Surgeon, N. G. P.

For almost ten years the National Guard of Pennsylvania has annually gone into camp for a period of from six to eight days during one of the summer months. The annual summer camp is of recognized value as a practical school of instruction to every guardsman, and is especially valuable to the military surgeon, for at that time the cares of general or special practice are laid aside, and for one week he submits to a rigid daily military routine.

These camps are very popular, as is attested by the large number of visitors there, particularly on Sunday and days of special interest, when reviews and inspections are the attractions. The assembling of thousands of people in all conditions of health, when the sun perhaps is keeping the thermometer near the century mark for days, necessarily occasions cases of sudden illness, particularly among the overclothed and the imprudent. Ordinarily, the number of these cases is few, and they serve as a diversion gladly assumed by the various medical men of the different commands. In fact, I have even heard of a rivalry to secure for treatment a civilian accidentally injured, that would have done credit to the various hospitals in one of our large cities.

That a paucity of cases does not always exist, and that the treatment of sick and injured visiting civilians may be a matter of sufficient consequence to demand at least passing notice, was impressed upon me at camp last summer.

The First Brigade N. G. P. went into camp July 19th, 1895, at Sanatoga, Pa. The site selected was adjacent to a picnic ground at the terminus of a trolley road running from Pottstown, four

miles distant. This resort was fitted out with the usual entertaining features, such as toboggan slide, carousal etc.

The location of the different commands as to proximity to railroad and other stations, as well as the principal avenues of entrance to the camp, will greatly determine the number of visitors applying for relief to any one of the hospitals. To Battery A was assigned a location so unpleasantly near the above mentioned features as to make them intensely interesting. After a march to camp of forty miles over rough, dusty roads, with the thermometer in the nineties, the above mentioned circumstances were not especially conducive to our much needed rest. The excessive heat added materially to the duties of the medical department, the thermometer hovering in the vicinity of the century mark during the greater part of the first two days in camp.

The causes above mentioned combined to make the days spent at Sanatoga extremely busy ones, and at times tested fully the capacity of my hospital tent, and necessitated the use of its flies as a cover for the overflow.

The foregoing statements are made as explanatory of the circumstances occasioning this paper.

The cases of sickness among the command of eighty-two men were but few, and were mainly consequent upon our march through the heat. Several accidental injuries also necessitated attention, the most severe perhaps being a crushed finger, caught during the hurried closing of the breech-block of one of the pieces while the battery was in action during a sham battle. There were some other minor injuries, incidental to the handling of the pieces and the management of horses unaccustomed to the work they were doing.

These were but trifling, however, compared with the amount of work devolving upon us by reason of sickness and injury to civilians. Their inability to stand the heat was in marked contrast with the manner in which it was borne by the guardsmen, and emphasized the hardening effect of months of systematic drilling.

On Sunday, the hottest day we were in camp, the number of cases treated in my hospital was twenty-seven, only three of whom were battery men, and, excepting four surgical cases, were all directly referable to the intense heat. They ranged from moder-

ately severe to grave, and one case threatened a fatal termination.

Monday brought sixteen cases, thirteen civilians and three members of the company. There were some cases subsequently, but Sunday and Monday were the banner days.

The arrangement for water supply by means of pipes and hydrants was not extended to the battery, hence the management of these cases by hydro-therapy was made more difficult. I also found that it encroached materially upon the supply of ice furnished the command.

The injuries treated included a fracture of the tibia and fibula; several injuries through runaway accidents, principally contusions and lacerations; one extensive laceration of arm occasioned by a bicycle accident; several hand injuries; and three patients injured by a trolley collision, one of whom suffered from concussion of the brain, one from incised wound of head and forearm, and the other from contusion of head and incised wound of elbow.

One other matter that gave me much concern for some days, was brought to my notice immediately upon my arrival at camp. A cook who accompanied the detail sent three days in advance of the company to prepare the camp, was taken seriously ill with fever and bowel disturbance, accompanied by delirium of such a violent character as to require forcible physical restraint. The temperature on my arrival was about 102° , and the case was suspiciously like typhoid fever. Recalling the experience of Company C, Ninth Regiment, at division camp at Gettysburg one year before, in which a patient suffering from unrecognized typhoid, on account of inability to stand the fatigue of active duties, was detailed by a sergeant to duty at the mess-tent, thereby becoming responsible for twenty-one other cases, three of them fatal, I had this patient removed from camp immediately and sent to the Philadelphia Hospital. Whether prompt action averted trouble or not, I cannot say, but my anxiety was not relieved for some days. As far as I could see, no trouble ensued among the men from this case, although it pursued a rather obscure course after removal to the Philadelphia Hospital.

It is not my intention to elaborate upon the nature of the cases treated. My object is rather to call attention to what might be

termed a necessary evil, consequent upon the general interest in the summer camp.

Experience it certainly was, and of great practical value in drilling the hospital corps; but it would have been very inconvenient had not the men of the company proven themselves to be of sterner material. With the capacity of the hospital already overtaxed, emergency cases occurring among our own men could not have received the prompt and efficient attention they would have a right to expect, and would have necessitated a readjustment of the occupants of the cots, perhaps detrimental to their well being.

The limited supply of bandages, splints etc., issued for the week's camp, proved unequal to the extra demand upon it, and disappeared like snow before a summer sun; hence, after two days in camp, I was obliged to renew my supply at a Pottstown drug store.

The final disposition of the cases, if possible, on the same day on which they were received into the hospital, was, in some instances, a matter of difficulty. For obvious reasons their presence in the hospital over night is very undesirable.

The Pottstown hospital was five miles away and its ambulance was not permitted to come further than the borough limits, about two miles distant from camp. I had some patients conveyed that far in regimental ambulances kindly loaned for the purpose, and there transferred to the Pottstown hospital ambulance. Others were removed in private conveyances, while the removal of some brought into the hospital late in the day was barely effected before taps were sounded.

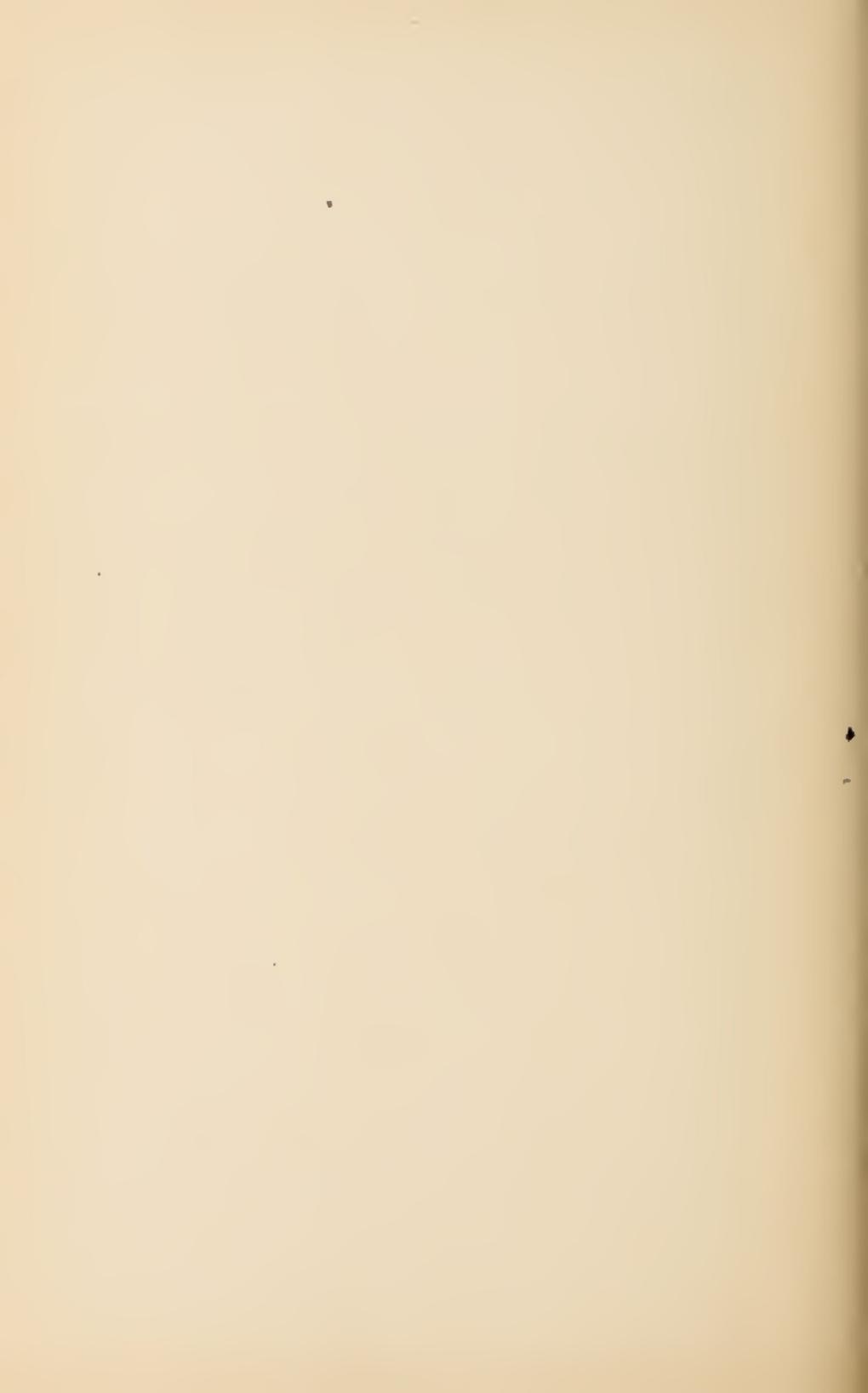
Conditions which would facilitate this work, and overcome the objectionable features of it, readily suggest themselves. Where the camp is near a city having a general hospital, some arrangement might be entered into whereby these cases could b removed from camp as soon as their condition would permit; this to mean before taps, excepting only such cases as would be jeopardized by such removal. In the absence of such arrangements a provisional hospital could be arranged at camp when deemed advisable.

Of course this service is purely a voluntary one, and not at all obligatory upon the Medical Department of the National Guard,

but humane impulses are not entirely eradicated from the heart of the military surgeon, and they dictate the same kindly attention to the suffering civilian as is demanded by the sick or injured guardsman.

Camp Robert P. Dechert may have been an exception in the number of cases requiring attention at any one particular hospital, and inasmuch as in this instance it devolved upon a smaller working force than is found in a regimental hospital, the time consumed and service demanded made it felt the more by the few who had it to do.

This work was all done with the utmost cheerfulness by all concerned, and the spirit of this paper is not one of murmuring. Personally, I regarded it not only a duty, but esteemed it a privilege, and yet, despite the added experience from the standpoint of physician and surgeon, time was consumed which should have been spent in perfecting myself and the hospital corps in a knowledge of those duties appertaining more especially to us as members of the National Guard.



CONSTITUTION, BY-LAWS,
ROSTER OF OFFICERS
AND MEMBERS.

1896-97.

CONSTITUTION AND BY-LAWS OF THE ASSOCIA-
TION OF MILITARY SURGEONS OF
THE UNITED STATES.

PREAMBLE

The military surgeons of the United States, in order to promote and improve the science of military surgery, have associated themselves together and adopted the following Constitution and By-Laws:

CONSTITUTION.

ARTICLE I.

Name.

The organization shall be known as "The Association of Military Surgeons of the United States."

ARTICLE II.

Members.

SECTION 1. There shall be active, associate, honorary, corresponding, and life members.

Active Members.

SEC. 2. Commissioned medical officers of the United States Army, of the Navy, and of the National Guard, or Volunteer Militia of the several States are eligible for active membership. Active members may retain their membership should they be honorably discharged from the service in which they were commis-

sioned. Active members only shall be eligible for office or entitled to vote.

Associate Members.

SEC. 3. Ex-medical officers and other officers of either of the above-mentioned services, and of the Marine Hospital Service, and ex-medical officers of the United States Volunteer Service are eligible for associate membership.

Honorary Members.

SEC. 4. Persons who are not qualified for active membership, but who have achieved distinction in the military service, are eligible as honorary members.

Corresponding Members.

SEC. 5. Military surgeons living outside of the United States, who are prominent in the literature of military medicine and hygiene, are eligible as corresponding members.

Life Members.

SEC. 6. On payment of the sum of \$50.00 any active member may become a life member and be exempt from further dues.

ARTICLE III.

OFFICERS AND COMMITTEES.

Officers.

SEC. 1. The officers shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and an Editor, who shall hold their respective offices until their successors are elected and qualified.

Committees.

SEC. 2. There shall be the following standing committees: An Executive Committee, to consist of the officers and ex-presidents and five (5) members. A Publication Committee, to consist of three (3) members. A Literary Committee, to consist of three (3) members of the National Guard or Militia, and one (1) each

from the Army and Navy A Nominating Committee, based upon a representative, or one vote, for each State or Territory, the Army, and the Navy, and for every additional ten (10) members or major fraction thereof, an extra representative or vote; said vote or votes to be cast by a member or members present from each State, Territory, Army, and Navy, to be designated by the members present from each State, Territory, Army, and Navy at the time of the meeting.

ARTICLE IV.

Quorum.

Thirty-five (35) members shall constitute a quorum for the transaction of business, but a less number may adjourn.

ARTICLE V.

Amendments.

All amendments to this Constitution and By-Laws shall be proposed in writing at one annual meeting, and voted on at the next. A three-fourths vote of all the members present at the annual meeting shall be necessary for adoption.

BY-LAWS.

ARTICLE I.

Election to Membership.

SEC. 1. Election to active or associate membership shall be by the Executive Committee, to whom the Secretary shall refer all applications, together with such credentials as may be presented.

SEC. 2. Election to honorary or corresponding membership shall be by a two-thirds vote of the Association, after the unanimous recommendation of the Executive Committee.

ARTICLE II.

Loss of Membership.

Any member who may be dismissed from the service for conduct unbecoming an officer and a gentleman shall be expelled and

debarred from any further rights or privileges when proper proof has been furnished the Secretary.

ARTICLE III.

Meetings.

The Association shall meet annually, the time and place to be fixed at each meeting for the one ensuing. Special meetings may be called by the President at any time. At the annual meeting the President, Vice-Presidents, Secretary, Treasurer, and Editor shall be elected for the term of one year, the standing committees appointed, and the annual reports received.

ARTICLE IV.

Dues.

The dues to be paid by active and associate members shall be five dollars (\$5.00), due at the time of election; thereafter on January 1 of each year, in advance. Delinquents in the payment of dues will not be entitled to the Proceedings or other publications of the Association.

Delinquency for two years shall terminate membership, after due notice by the Treasurer.

Honorary, corresponding, and life members shall be exempt from the payment of dues.

ARTICLE V.

DUTIES OF OFFICERS.

The President.

SEC. 1. The President shall preside at all meetings, appoint all committees, unless otherwise provided for, approve all proper bills, and perform such other duties as are usually incumbent upon such an officer.

The Vice-Presidents.

SEC. 2. The Vice-Presidents, in order of seniority, shall perform the duties of President in the absence or inability of that officer.

The Secretary.

SEC. 3. The Secretary shall keep the records and archives, issue certificates of membership to honorary and corresponding members on election, to active and associate members when notified by the Treasurer that the proper dues have been paid.

He shall present to the Committee on Publications a synopsis of the proceedings, and such papers as the authors desire to have published by the Association. He shall receive all applications for membership and refer the same to the Executive Committee. He shall notify the Treasurer of the election of active and associate members, and shall prepare an annual report. At each annual meeting he shall appoint an Assistant Secretary.

The Treasurer.

SEC. 4. The Treasurer shall receive all moneys due the Association, collect all assessments, and pay all bills which have been properly approved. He shall have charge of all publications, and distribute the same to those who are entitled to them. He shall notify the Secretary when new active and associate members have paid and are entitled to certificates of membership.

The accounts of the Treasurer shall be audited by a committee appointed for that purpose on or before the annual meeting. He shall present an annual report.

He shall execute such a bond of \$2,000 as may be approved by the Executive Committee for the faithful performance of his duties; the Association to bear the cost of this insurance.

The Editor.

SEC. 5. The Editor shall prepare for publication and see through the press all material furnished him by the Publication Committee. All contracts for printing must first have the approval of the President and Treasurer.

ARTICLE VI.

DUTIES OF COMMITTEES.

The Executive Committee.

SEC. 1. The Executive Committee shall perform the duties prescribed by the Constitution and By-Laws, and such other

administrative or executive duties as may be referred to it, and for which provision has not otherwise been made. The President shall be *ex officio* chairman.

The Publication Committee.

SEC. 2. The Publication Committee shall determine what portions of the proceedings are of sufficient general interest to be printed.

It shall also decide on the advisability of publishing the various papers presented at the annual meeting, and forward all such material to the Editor, and all papers presented to and accepted by the Association shall be its property, and shall not be published in any other form, except by the authority of the Executive Committee, and shall be credited to the Association.

The Literary Committee.

SEC. 3. The Literary Committee shall outline the literary work for the annual meeting in advance, making the necessary arrangements for the reading and discussion of papers.

The Nominating Committee.

SEC. 4. The Nominating Committee shall, at the annual meeting, present a list of candidates for the various offices for the ensuing year.

The vote, or votes, of the Nominating Committee shall be cast by a member, or members, who shall be designated by the members present, from each State or Territory, the Army, and the Navy.

OFFICERS OF THE ASSOCIATION FROM ITS FIRST ORGANIZATION.

FIRST MEETING HELD AT LELAND HOTEL, CHICAGO, ILL., SEPT. 17-18, 1891.

1891-92.

SECOND MEETING HELD AT MEMORIAL HALL, ST. LOUIS, MO.,
APRIL 19, 20 AND 21, 1892.

President—Nicholas Senn, Brig.-Gen. and Surg.-Gen., Wis.

Vice-President—Nelson H. Henry, Major and Surgeon, N. G. N. Y.

Second Vice-President—E. Chancellor, Lt.-Col., Med. Director, N. G. Mo.

Secretary—F. L. Matthews, Col. and Surg.-Gen., N. G. Ill.

Cor. Secretary—Ralph Chandler, Lieut. and Asst.-Surg., L. A., N. G. Wis.

Treasurer—Francis J. Crane, Col. and Surg.-Gen., Col.

Chairman Com. of Arrangements for 1892—Lieut.-Col. E. Chancellor.

1892-93.

THIRD MEETING HELD AT RUSH MED. COLLEGE AND U. S. GOV. BUILDING,
CHICAGO, ILL., AUG. 8, 9 AND 10, 1893.

President—Nicholas Senn, Col. and Surg.-Gen., N. G. Ill.

Honorary President—C. R. Greenleaf, Lt.-Col. and Dpty Surg.-Gen., U. S. A.

Vice-President—Nelson H. Henry, Major and Surgeon, N. G. N. Y.

Second Vice-President—C. M. Woodward, Lt.-Col. and Surg.-Gen., Mich.

Secretary—E. Chancellor, Lt.-Col. and Med. Director, N. G. Mo.

Cor. Secretary—Ralph Chandler, Lt. and Asst. Surg., L. A., N. G. Wis.

Treasurer—Francis J. Crane, Col. and Surg.-Gen., N. G. Col.

Chairman Com. of Arrangements for 1893—Capt. Chas. Adams, Chicago.

1893-94.

FOURTH MEETING HELD AT NATIONAL THEATRE AND NATIONAL MUSEUM,
WASHINGTON, D. C., MAY 1, 2 AND 3, 1894.

President—Nicholas Senn, Col. and Surg.-Gen., N. G. Ill.

Vice-President—B. J. D. Irwin, Col. and Asst. Surg.-Gen., U. S. A.

Second Vice-President—Louis W. Read, Col. and Surg.-Gen., N. G. Pa.

Secretary—E. Chancellor, Lt.-Col. and Med. Director, N. G. Mo.

Assistant Secretary—Julian M. Cabell, Capt. and Asst. Surg., U. S. A.
Treasurer—Lawrence C. Carr, Major and Surg., Ohio N. G.

Chairman Com. of Arrangements for 1894—Geo. Henderson, Major and
Surg.-Gen., D. C.

1894-95.

FIFTH MEETING HELD AT STAR THEATRE AND ALUMNI HALL, UNIVERSITY
OF BUFFALO, BUFFALO, N. Y., MAY 21, 22 AND 23, 1895.

President—George M. Sternberg, Brig.-Gen. and Surg.-Gen., U. S. A.

Vice-President—Louis W. Read, Col. and Surg.-Gen., N. G. Pa.

Second Vice-President—Albert L. Gihon, Med. Director, U. S. Navy.

Secretary—E. Chancellor, Lt.-Col. and Med. Director, N. G. Mo.

Assistant Secretary—Julian M. Cabell, Capt. and Asst. Surg., U. S. Army.

Treasurer—Lawrence C. Carr, Major and Surg., Ohio N. G.

Chairman Com. of Arrangements for 1895—Albert H. Briggs, Major and
Surg., N. G. N. Y.

1895-96.

SIXTH MEETING HELD AT PHILADELPHIA, PA. HEADQUARTERS AT HOTEL
WALTON, MAY 12, 13 AND 14, 1896.

President—Louis W. Read, Col. and Surg.-Gen., N. G. Pa.

Vice-President—Albert L. Gihon, Med. Director, U. S. Navy.

Second Vice-President—Charles H. Alden, Asst. Surg.-Gen., U. S. A.

Secretary—E. Chancellor, Lt.-Col. and Med. Director, N. G. Mo.

Assistant Secretary—P. F. Harvey, Major and Surgeon, U. S. A.

Treasurer—Lawrence C. Carr, Major and Surgeon, Ohio N. G.

Chairman Com. of Arrangements for 1896—J. Wilks O'Neill, Major and
Surg., N. G. Pa.

THE ASSOCIATION OF MILITARY SURGEONS OF
THE UNITED STATES.

REGISTER OF MEMBERS.

REVISED TO JANUARY 1ST, 1897.

NOTE.—The designations after each name in the Register of Members indicate (first) the grade of Military and Naval precedence, and (second) Corps Title. In the case of Naval Officers the grades are in brackets, indicating what is termed their "relative rank." They are addressed officially by their Corps Titles, but in social intercourse it is customary in the Navy to address them simply as "Doctor." The following table exhibits the correspondence of Military and Naval grades and titles:

MILITARY.		NAVAL.	
GRADES.	TITLES.	GRADES.	TITLES.
Brig. General.	Surg. General.	Commodore.	Surg. General.
Colonel.	Asst. Surg. General.	Captain.	Med. Dir. (ret'd.)
Lt. Colonel.	Dep. Surg. General.	Commander.	Med. Director.
Major.	Surgeon.	Lt. Commander.	Med. Inspector.
Captain.	Asst. Surg. (af. psg.)	Lieutenant.	Surgeon.
1st. Lieut.	Asst. Surgeon.	Lt. j(unior)g(rade.)	Pd. Asst. Surgeon.
		Ensign.	Asst. Surgeon.

ACTIVE MEMBERS.

- | | |
|-------------------------|---|
| Abbe, Edward Harper, | (Lt. j.g.) Asst. Surg. M. V. M.,
405 County St., New Bedford, Mass. |
| Adair, George William, | Maj. and Surg. U. S. A.,
Washington, D. C. |
| Adams, Charles Francis, | Capt. and Asst. Surg., N. G. N. J.,
229 Union St., Hackensack, N. J. |
| Adams, C. W., | Lieutenant,
12th & Grand Sts. Kansas City, Mo. |
| Allen, Gardner Weld, | Lt. Col. and Surg., M. V. M.,
417 Boylston St., Boston, Mass. |

Almy, Leonard Ballou,	Lt.-Col. and Med. Dir., N. G. Conn., 173 Washington St., Norwich, Conn.
Altree, Geo. Herbert,	Act. Asst. Surg. U. S. M. H. S., Fort Tampa, Fla.
Ames, Howard Emerson,	(Lt.) Surg. U. S. N., Navy Dept., Washington, D. C.
Anderson, Frank,	(Lt.) Surg. U. S. N., 1628 19th St., N. W., Wash., D. C.
Anthony, Frank,	Maj. and Surg., N. G. Ill., First Ave., Sterling, Ill.
Appel, Aaron H.,	Capt. and Asst.-Surg., U. S. A., Fort Porter, N. Y.
Appel, Dan'l Mitchell,	Maj. and Surg. U. S. A., Little Rock, Ark.
Archibald, O. Wellington,	Col. and Surg.-Gen., N. G. No. D., Jamestown, No. Dak.
Arnold, Herbert A.,	1st Lt. and Asst.-Surg., N. G. P., Ardmore, Pa.
Arnold, Will Ford,	(Lt. j. g.) Pd. Asst.-Surg. U. S. N., Care Navy Dept., Washington, D. C.
Ashenfelter, Wm. J.,	Maj. and Sur. N. G. Pa., Pottstown, Pa.
Ashley, Maurice C.,	1st Lt. and Asst. Surg. N. G. S. N. Y., Middletown, N. Y.
Ashmun, Geo. C.,	Maj. and Surg., O. N. G., 94 Republic St., Cleveland, O.
Bache, Dallas,	Col. and Asst. Surg.-Gen. U. S. A., Omaha, Neb.
Baker, John Walter,	(Lt. j. g.) Pd. Asst.-Surg., U. S. N., Mare Island, Cal.
Baker, Washington Hopkins,	Maj. and Surg. N. G. P. (retired), 1610 Summer St., Philadelphia, Pa.
Balch, Lewis,	Maj. and Surg., N. G. S. N. Y., 14 Washington Ave., Albany, N.Y.
Baldridge, Felix Edgar,	1st Lt. and Asst.-Surg., S. T. Ala., 317 W. Clinton St., Huntsville, Ala.
Banister, John Monro,	Maj. and Surg., U. S. A., Fort Leavenworth, Kas.
Barber, George Holcombe,	(Lt. j. g.) Pd. Asst.-Surg., U. S. N., U. S. N. Academy, Annapolis, Md.
Barker, Christopher F.,	Maj. and Surg., R. I. M., 32 Bull St., Newport, R. I.

Barnes, A. S.,	Major,	
Bates, Newton L.,		5434 Maple Ave., St. Louis, Mo.
Battle, Samuel Westray,	(Capt.) Med. Dir., U. S. N.,	Care The Shoreham, Wash., D.C.
Bauer, Louis Demme,	Maj. and Asst. Surg. Gen. N. C., (Lt. j. g.)	Pd. Asst.-Surg. U. S. N. (retired),
Bayles, George,		Asheville, N. C.
Beck, George,	1st Lt. and Asst. Surg., N. G. P.,	
Belcher, William Nathan,		715 N. 5th St., Philadelphia, Pa.
Bell, Robt. Eddy,	Maj. U. S. A.,	
Benedict, John Mitchell,		408 Main St., Orange, N. J.
Bergen, Andrew C.,	Capt., Asst. Med. Dir. U. S. N.,	926 N. Broad St., Elizabeth, N. J.
Bertolette, Daniel Nicholas,	Capt. and Asst. Surg. N. G. S. N. Y.,	25 Portland Ave., Brooklyn, N. Y.
Beyer, Ph. D., Henry Gustav,	2d Lt. Amb. Corps, M. V. M.,	
Birmingham, Henry P.,		Lowell, Mass.
Blackwood, Norman Jerome,	Ex-Maj. and Surg. N. G. Conn.,	
Blood, Robert Allen,		81 N. Main St., Waterbury, Conn.
Boardman, Walter,	Lt.-Col. and Surg. N. G. Ia.,	
Bockman, Edward,		400 4th St., Sioux City, Ia.
Borden, William Cline,	(Lt.) Surg. U. S. N.,	
Bowen, George Austin,		Care Navy Dept. Washington, D. C.
Boyd, John G.,	(Lt.) Surg. U. S. N.,	
		Marine Barracks, Washington, D. C.
	Capt. and Asst. Surg., U. S. A.,	
		Ft. Trumbull, New London, Conn.
	(Lt. j. g.) Pd. Asst.-Surg., U. S. N.	
		Care Navy Dept., Washington, D. C.
	Brig.-Gen. and Surg. Gen. M. V. M.,	
		39 High St., Charleston, Mass.
	1st Lt. and Asst. Surg. N. G. Pa.,	
		Lancaster, Pa.
	Lt. Col. and Asst. Surg. Gen., N. G. Minn.,	
		Lowry Arcade, St. Paul, Minn.
	Capt. and Asst. Surg. U. S. A.,	
		Fort Snelling, Minn.
	Brig.-Gen. and Surg. Gen. N. G. Conn.,	
		Woodstock, Conn.
	(Lt.) Surg. U. S. N.,	
		Care Navy Dept., Washington, D. C.

Boyd, Robert,	Ex (Ensign) Asst. Surg. U. S. N., Philadelphia, Pa.
Bradbury, Bial Francisco,	Maj. and Surg., Me. V. M., Norway, Me.
Bradley, Alfred E.,	Capt. and Asst.-Surg., U. S. A., Ft. Yellowstone, Wyo.
Bradley, George Perly,	(Lt. Cmdr.) Surg. U. S. N., Navy Yard, New York.
Brannon, Dennis J.,	Capt. and Asst.-Surg., N. G. Ariz., Flagstaff, Ariz.
Briggs, Albert Henry.	Maj. and Surg., N. G., S. N. Y., 267 Hudson St., Buffalo, N. Y.
Brooks, William Allen, Jr.,	1st Lt. and Asst. Surg., M. V. M., 167 Beacon St., Boston, Mass.
Brown, Orland J.,	Maj. and Surg. M. V. M., North Adams, Mass.
Brown, Paul Richard.	Maj. and Surg., U. S. A., Fort Hamilton, N. Y.
*Browne, John Mills,	(Commodore) Surg. Genl. U. S. N., Washington, D. C.
Brubaker, John L.,	1st Lt. and Asst. Surg. N. G. Pa. 1224 4th Ave., Altoona, Pa.
Bryant, Joseph Decatur,	Brig.-Gen. and Surg. Gen., N. G. S. N. Y. (retired), 54 W. 36th St., New York.
Budlong, John Clark,	Brig.-Gen. and Surg.-Gen. R. I. M. (retired) 604 Westminster St., Providence, R. I
Bunts, Frank Emory,	Capt. and Asst. Surg. O. N. G., 275 Prospect St., Cleveland, O.
Burgin, Herman,	Maj. and Surg., N. G. P., Germantown, Pa.
Burns, Robert,	Maj. and Surg., N. G. N. H., Plymouth, N. H.
Burrell, Herbert Leslie,	Brig.-Gen. and Surg. Gen. M. V. M. (retired) 22 Newbury St., Boston, Mass.
Buttner, Charles,	Maj. and Surg. N. G. N. J., Orange, N. J.
Byers, Frederick W.,	Brig.-Gen. and Surg. Gen., N. G. Wis., Monroe, Wis.
Byrne, Charles C.,	Col. and Asst.-Surg. Gen. U. S. A., Governor's Island, N. Y.

* Deceased.

Cabell, Julian Mayo,	Capt. and Asst. Surg. U. S. A., David's Island, N. Y. Harbor.
Campbell, William Francis,	1st. Lt. and Asst. Surg. N. G. S. N. Y., 127 Lafayette Ave., Brooklyn, N.Y.
Campbell, William Robertson,	1st Lt. and Asst. Surg. N. G. S. N. Y., Niagara Falls, N. Y.
Carey, Charles H.,	Capt. and Asst. Surg. N. G. Wis., Darlington, Wis.
Carpenter, Dudley Newcomb,	Asst. Surg. U. S. N., Navy Yard, Brooklyn, N. Y.
Carr, George Wheaton,	Lt. Col. and Med. Dir. R. I. M. (retired), 27 Waterman St., Providence, R. I.
Carr, Lawrence Carlos,	Maj. and Surg. O. N. G. (retired), 143 N. 7th St., Cincinnati, Ohio.
Carrington, Charles Venable,	Capt. and Asst. Surg. W. Va., 932 Park Ave., Richmond, Va.
Cassidy, Patrick,	Ex-Brig. Gen. and Surg. Gen. N. G. Conn., Norwich, Conn.
Castle, Charles Henry,	Capt. and Asst.'Surg. O. N. G., 215 W. 9th St., Cincinnati, O.
Cawley, Morris Franklin,	1st Lt. and Asst. Surg. N. G. P., 31 N. 9th St., Allentown, Pa.
Chandler, Ralph,	Capt. and Asst. Surg. N. G. Wis., 13 Grand Ave., Milwaukee, Wis.
Chase, H Lincoln,	1st Lt. and Asst. Surg. M. V. M., 126 Harvard St., Brookline, Mass.
Clark, Thomas Chalmers,	Maj. and Surg. N. G. Minn., Stillwater, Minn.
Cole, Charles M.,	1st Lt. and Asst. Surg. R. I. M., 250 Broadway, Newport, R. I.
Cook, Charles P.,	Col. and Asst. Surg. Gen. N. G. S. N. Y., 243 Warren St., Hudson, N. Y.
Cook, Frank Clarendon,	(Ensign) Asst. Surg. U. S. N., U. S. Naval Hospital, New York.
Cook, George,	Ex-Brig. Gen. and Surg. Gen. N. G. N. H., 16 Centre St., Concord, N. H.
Corwin, Richard Warren,	Col. and Asst. Surg. Gen. N. G. Col., Pueblo, Col.
Cowell, George B.,	1st Lt. and Asst. Surg. N. G. Conn., 120 E. Washington Ave., Bridgeport, Conn.

Craig, Thomas Canby,	(Lt.) Surg., U. S. N., 205 Cumberland St., Brooklyn, N. Y.
Crandall, Rand Perry,	(Lt. j. g.) Pd. Asst. Surg. U. S. N., U. S. Naval Hospital, New York.
Crego, Floyd Stranahan,	Maj. and Surg. N. G. S. N. Y., 469 Delaware Ave., Buffalo, N. Y.
Crispel, Charles Winegar,	1st Lt. and Asst. Surg. N. G. S. N. Y., Rondout, N. Y.
Currier, Edward Hervey,	Lt.-Col. and Med. Dir. N. G. N. H., 782 Elm St., Manchester, N. H.
Cullen, Gilbert I.,	Capt. and Asst. Surg. O. N. G., Cincinnati Hospital, Cincinnati, O.
Dawson, Lewis R.,	Maj. and Surg., Box 249 Seattle, Washington.
Day, Frank Leslie,	Maj. and Surg., 240 Benefit St., Providence, R. I.
Dearing, Howard Sumner,	1st Lt. and Asst. Surg. M. V. M., 607 Tremont St., Boston, Mass.
DeNiedman, Wladimir Feodor,	Maj. and Surg. N. G. Kas., Lachta Place, Pittsburg, Kas.
Derr, Ezra Z.,	(Lt.) Surg. U. S. N., Navy Yard, New York.
Devine, William H.,	Maj. and Surg. M. V. M., 595 Broadway, So. Boston, Mass.
Dixon, Charles Henry,	Maj. and Surg. N. G. Mo., 3345 Morgan Ave., St. Louis, Mo.
Dunn, J. P.,	Maj. and Surg. N. G. Cal., 536 24th St., Oakland, Cal.
Dunn, Lewis D.,	(Lt. j. g.) Asst. Surg. N. M. Ill., 428 19th St., Moline, Ill.
Dutton, Charles Elvan,	1st Lt. and Asst. Surg. N. G. Minn., 602 Nicollet Ave., Minneapolis, Minn.
Eagleson, James Beaty,	Col. and Surg. Gen. N. G. Wash., 512 Burke Bldg., Seattle, Wash.
Edie, Guy L.,	Capt. and Asst. Surg. U. S. A., Presidio of San Francisco, Cal.
*Eggers, John T.,	Capt. and Asst. Surg. N. G. Mo., Kansas City, Mo.
Egle, William Henry,	Maj. and Surg. N. G. Pa., Harrisburg, Pa.

*Deceased.

Emmerling, Karl A.,	1st. Lt. and Asst. Surg. N. G. Pa., Pittsburg, Pa.
Erwin, James Jay,	Capt. and Asst. Surg. O. N. G., 1617 Cedar Ave., Cleveland, O.
Etheridge, James H.,	Maj. and Surg. N. G. Ill., 1634 Michigan Ave., Chicago, Ill.
Evans, Theodore W.,	Maj. and Surg. N. G. Wis., 3 Pinckney St., Madison, Wis.
Ewen, Clarence,	Maj. and Surg. U. S. A., P. O. Box 641, Los Angeles, Cal.
Farrell, P. J. H.,	Capt. and Asst. Surg. N. G. Cal., 235 Post St., San Francisco, Cal.
Festorazzi, Angelo,	Ex-1st Lt. and Asst. Surg. S. T. Ala., 153 Government St., Mobile, Ala.
*Fisher, Walter W. R.,	Capt. and Asst. Surg. U. S. A., Fort Meade, S. D.
Fisher, William Henry,	Act. Asst. Surg. U. S. M. H. S., 704 Madison St., Toledo, Ohio.
Fitzgerald, Reynaldo Juan,	Lt.-Col. and Med. Dir. N. G. Minn., 128 5th St., Minneapolis, Minn.
Fitzpatrick, Charles, Jr.,	1st Lt. and Asst. Surg. N. G. Pa., 2223 Jefferson St., Philadelphia, Pa.
Flagg, George Washington,	Maj. and Surg. N. G. N. H., 53 Summer St., Keene, N. H.
Forin, Alexander,	1st Lt. and Asst. Surg. N. G. Minn., St. Paul, Minn.
*Forster, Edward Jacob,	Brig. Genl. and Surg. Gen. M. V. M., Boston, Mass.
Forwood, William Henry,	Lt.-Col. and Dep. Surg. Gen. U. S. A., Washington, D. C.
Foster, Charles Chauncy,	Maj. and Surg. M. V. M., 8 Elmwood Ave., Cambridge, Mass.
Foster, Romulus Adams,	1st. Lt. and Asst. Surg. N. G. D. C., 2029 Q St. N. W. Washington, D. C.
Fowler, George Ryerson,	Maj. and Surg. N. G. S. N. Y., 301 De Kalb Ave., Brooklyn, N. Y.
Frazier, Charles Harrison,	1st Lt. and Asst. Surg. N. G. Pa., 133 So. 18th St., Philadelphia, Pa.

French, Charles Henry,	Lt.-Col. and Med. Dir. R. I. M., 109 Broadway, Pawtucket, R. I.
Fritts, Crawford E.,	1st Lt. and Asst. Surg. N. G. S. N. Y., Hudson, N. Y.
Fryar, James F.,	Maj. and Surg. N. G. Tenn., E. Nashville, Tenn.
Fuchs, Frederick Louis,	1st Lt. and Asst. Surg. N. G. S. N. Y., 10 St. Marks Place, New York City.
Fuller, Charles Gordon,	Maj. and Surg. N. G. Ill., 39 Central Music Hall, Chicago, Ill.
Fulton, John F.,	Brig. Gen. and Surg. Gen. N. G. Minn., St. Paul, Minn.
Fulton, William C.,	Maj. and Surg. N. G. Pa., 433 Wyoming Ave, Scranton, Pa.
Gandy, Charles M.,	Capt. and Asst. Surg. U. S. A., Washington, D. C.
Gardner, Edwin Fisher,	Maj. and Surg. U. S. A., Fort Grant, Ariz.
Gardner, P.,	Capt. and Asst. Surg. U. S. A., Boston, Mass.
Gates, Manley F.,	(Lt. j. g.) Pd. Asst. Surg. U. S. N., Care Navy Dept., Washington, D. C.
Gauntt, Franklin,	Lt.-Col. and Surg. N. G. N. J., Burlington, N. J.
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